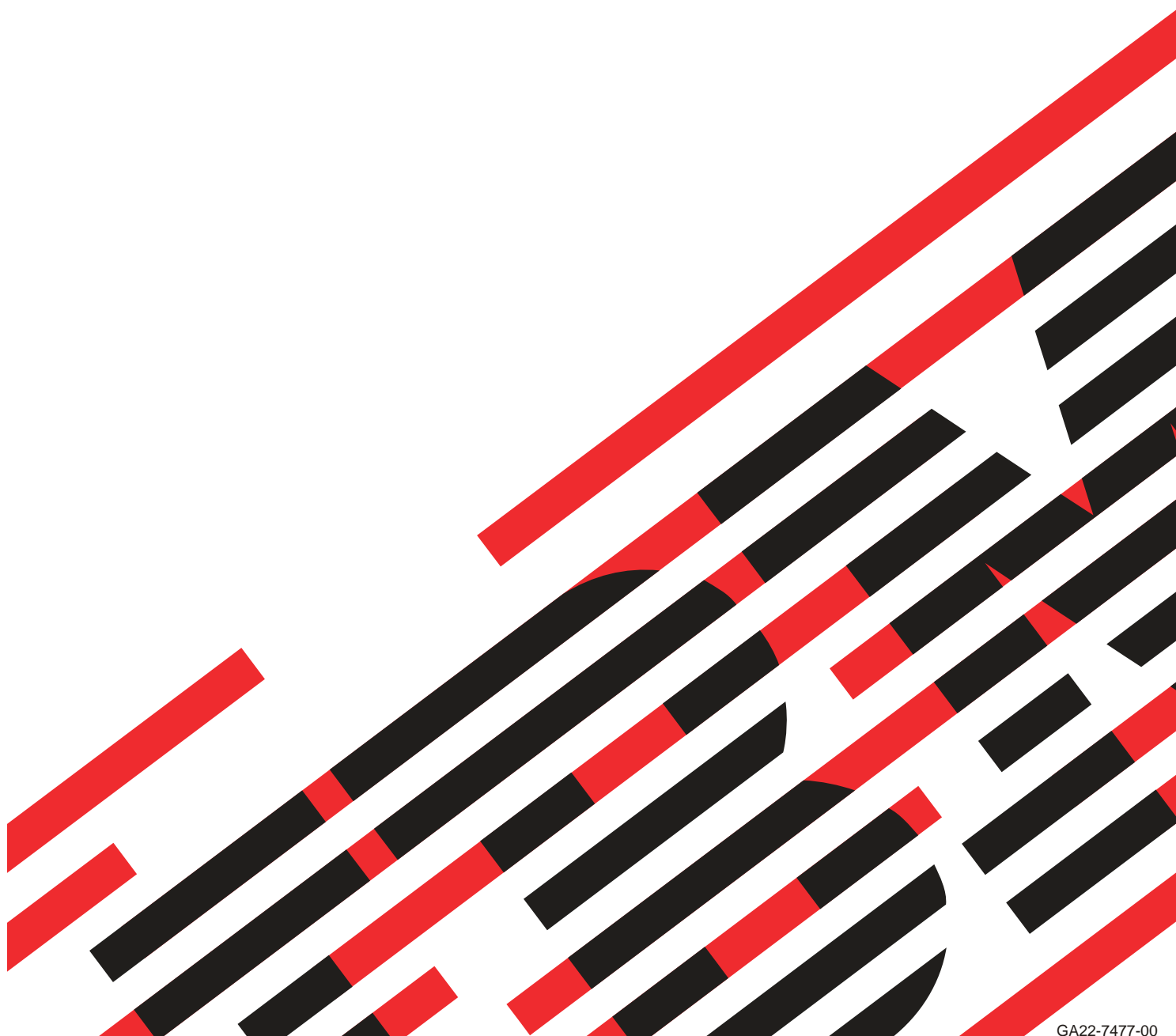




z Series 900

# Planning for the Open Systems Adapter-2 Feature







z Series 900

Planning for the  
Open Systems Adapter-2 Feature

**Note!**

Before using this information and the products it supports, be sure to read the general information under "Appendix. Notices" on page 147.

**First Edition (December 2000)**

This edition, GA22-7477-00, applies to the Open Systems Adapter-2 feature (Model 9672, Features 5201 and 5202), Open Systems Adapter Support Facility Version 2 Release 1 (Program Number 5655-B57) for OS/390 (Program Number 5647-A01) and z/OS (Program Number 5694-A01), Open Systems Adapter Support Facility for Virtual Machine/Enterprise Systems Architecture (VM/ESA) Version 2 Release 2.0 (Program Number 5654-030) and z/VM Version 3 Release 1 (Program Number 5654-A17), OSA/SF for VSE Version 2 Release 2 (part of VSE Central Functions 6.1.1, 5686-066) in VSE/ESA Version 2 Release 2.1 (5690-VSE), Version 2 Release 6 of OS/390 (5647-A01), and to all subsequent releases and modifications until otherwise indicated in new editions or technical newsletters.

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## About This Book

An OSA-2 is an integrated @server zSeries 900 hardware feature that combines the functions of an I/O channel with the functions of a network port to provide direct connectivity between z900 applications and their clients on the attached network. This book describes the Open Systems Adapter-2 feature and the Open Systems Adapter Support Facility (OSA/SF) with the goal of helping you to define, install, and use these products.

Planning information is also provided for the OSA Support Facility (OSA/SF). Although any OSA that runs in the TCP/IP Passthru mode can do so without being customized through OSA/SF, it can run with only limited function. OSA/SF is required for the full functions of the TCP/IP Passthru mode and any function of the other modes. In this book, the meanings of the OSA/SF parameters are discussed and the parameters are shown as they appear when displayed by the OSA/SF OS/2 interface (OSA/SF GUI) panels. Instructions for downloading OSA/SF GUI in a z/OS or OS/390 environment are also provided. For other OSA/SF instructions, refer to the OSA/SF User's Guide for the each of the programming environments that OSA supports.

---

## Who Should Use This Book

Planning for the installation and use of an OSA is a multi-dimensional task that incorporates planning for the OSA hardware I/O configuration, host programs such as VTAM, TCP/IP, and Communications Server, OSA modes, OSA/SF, and network planning. Usually, this planning activity requires the expertise of several people with complementing hardware, system, and network knowledge.

To assist you in organizing your OSA planning, task planning checklists are provided at the start of Chapter 2 (hardware), Chapter 3 (z/OS and OS/390), Chapter 4 (z/VM and VM/ESA), and Chapter 5 (VSE/ESA). Task planning checklists are provided for each OSA mode of operation in Chapters 6 through 8. Chapter 9 describes the OSA port parameters.

---

## Where to Find More Information

This book presents an OSA-centric perspective. To complete the system planning and to install either an OSA or OSA/SF, you will need to refer to other books as well because OSA is available on so many hardware platforms, supports so many network protocols, and can interact with so many programs on different operating systems.

**Note:** The following lists of books are definitely not exhaustive because it is only intended to point you to one or a small number of related manuals for each of the products discussed in this book. Note that the titles and order numbers of books that document other products are subject to change. Therefore, make sure that you check the IBM publications ordering system before ordering any of the books listed in this bibliography.

## On the OSA and OSA/SF Information Units

The OSA planning guide and OSA/SF user's guides are listed in the following tables. The hardcopy formats of these books are published when significant function is added to OSA or a new release of OSA/SF is issued. These books are also

available as files on softcopy bookshelves of the softcopy collection kits listed in the following tables. These files are updated periodically, depending on the cycle of the collection kit.

In addition to the OSA/SF user's guides, online help panels are available to supplement the online function panels that are presented by the OSA/SF OS/2 interface (GUI). These help panels include a set of "How To" instructions.

### For z900 Users

Book Title	Book Hardcopy Order #	Book Softcopy File Name	In z/OS Collection Kit #	Bookshelf File Name	Bookshelf Index File Name
<i>Planning for the z900 Open Systems Adapter-2 Feature</i>	GA22-7477 (Note 1)	IOA2GPxx	SK3T-4269	IOA2BKxx	IOA2BKxx
<i>OSA-Express Customer's Guide and Reference</i>	SA22-7476 (Note 1)	IOA2XPxx	SK3T-4269	IOA2BKxx	IOA2BKxx
<i>OSA/SF User's Guide</i>	SC28-3872	IOASUGxx	SK2T-5843(OS/390)	IOA390xx	IOA390xx

### For VM/ESA Users

Book Title	Book Hardcopy Order #	Book Softcopy File Name	In VM/ESA Collection Kit #	Bookshelf File Name	Bookshelf Index File Name
<i>Planning for the z900 Open Systems Adapter-2 Feature</i>	GA22-7477 (Note 1)	IOA2GPxx	SK3T-4269	IOA2BKxx	IOA2BKxx
<i>OSA-Express Customer's Guide and Reference</i>	SA22-7476 (Note 1)	IOA2XPxx	SK3T-4269	IOA2BKxx	IOA2BKxx
<i>VM/ESA: Open Systems Adapter Facility User's Guide</i>	SC28-1992	IOAVMSxx	SK2T-2067	IOAVUGxx	IOAVMSxx

### For VSE/ESA Users

Book Title	Book Hardcopy Order #	Book Softcopy File Name	In VSE/ESA Collection Kit #	Bookshelf File Name	Bookshelf Index File Name
<i>Planning for the System/390 Open Systems Adapter Feature</i>	GC23-3870	IOA1PGxx	SK2T-0060	IOAVSExx	IOAVSExx
<i>VSE/ESA Open Systems Adapter Facility User's Guide</i>	SC28-1946	IOAVSExx	SK2T-0060	IOAVSExx	IOAVSExx

#### Notes:

- GA22-7477 and SA22-7476 are available in PDF format on **Resource Link**. Go to

<http://www.ibm.com/servers/resourceLink>

and click on **Library** on the navigation bar.

2. The OS/390 collection kit, which is distributed with OS/390, is also available on the Internet through the OS/390 home page (<http://www.s390.ibm.com/os390>). Double-click on the Library icon. The *OS/390 Information Roadmap* should help you locate the OSA planning guide and OSA/SF user's guide.
3. SC28-1855 is distributed on the OSA/SF bookshelf in the OS/390 softcopy collection kit. These books can be ordered separately in hardcopy.
4. The *Program Directory* for IBM Open Systems Adapter Support Facility for OS/390 (5647-A01) and z/OS (5694-A01) is distributed on the OS/390 and z/OS product media.
5. The *Program Directory* for OSA/SF for VM/ESA V2R2–V2R4, and z/VM V3R1 is distributed with the VM product media..
6. The VM/ESA system softcopy collection kit is refreshed twice a year in the Spring and Fall, not quarterly.
7. The *Program Directory for IBM VSE/ESA Version 2 Release 2.1* (5790-VSE) is available to VSE/ESA 2.2.1 users only. For later releases, use the VSE/ESA program directory.

## On the Hardware Platforms that OSA Supports

- @server zSeries 900 System Overview, SA22-1027
- @server zSeries 900 PS/SM Planning Guide, SB10-7033
- @server zSeries 900 IOCP User's Guide and Channel-to-Channel Reference, SB10-7029
- @server zSeries 900 Hardware Management Console Guide, SC28-6805
- @server zSeries 900 Support Element Operations Guide, SC28-6802
- Processor Resource/Systems Manager Planning Guide, GA22-7236
- Placement Report and CHPID Report produced by the IBM Configurator (CFSYSTEM) which may be available from your IBM marketing representative.

## On the Host Programs that OSA Supports

### z/OS

#### **Communication Server for z/OS:**

- Communication Server for z/OS: IP Migration Guide, SC31-8773
- Communication Server for z/OS: IP Configuration Guide, SC31-8775
- Communication Server for z/OS: IP User's Guide, SC31-8780
- Communication Server for z/OS: SNA Network Implementation Guide, SC31-8777
- Communication Server for z/OS: SNA Resource Definition Reference, SC31-8778
- Communication Server for z/OS: SNA Migration Guide, SC31-8774

#### **HCD:**

- z/OS HCD Users's Guide, SC33-7988

#### **Security Server (RACF):**

- z/OS Security Server (RACF) Server Administration and Using, SC24-5923
- z/OS Security Server (RACF) Command Language Reference, SC22-7687

**APPC:**

- *z/OS MVS Planning: APPC Management*, SA22-7598

**RMF:**

- *z/OS RMF User's Guide*, SC33-7990
- *z/OS RMF Report Analysis*, SC33-7991

**UNIX System Services:**

- *z/OS UNIX System Services: Planning*, GA22-7801
- *z/OS UNIX System Services: Command Reference*, SA22-7802
- *z/OS UNIX System Services: User's Guide*, SA22-7801

**OS/390****Communication Server for OS/390:**

- *Communications Server for OS/390: High Speed Access Services User's Guide*, GC31-8676
- *Communications Server for OS/390: IP Planning and Migration Guide*, SC31-8512
- *Communications Server for OS/390: IP Configuration Guide*, SC31-8513
- *Communications Server for OS/390: IP User's Guide*, SC31-8514
- *Communications Server for OS/390: SNA Network Implementation Guide*, SC31-8563
- *Communications Server for OS/390: SNA Resource Definition Reference*, SC31-8565
- *Communications Server for OS/390 : SNA Resource Definition Samples*, SC31-8566
- *Communications Server for OS/390: SNA Planning and Migration Guide*, SC31-8622
- *CS for OS/390 V2R10 TCP/IP: Guide to Enhancements*, SG24-5631

**HCD:**

- *OS/390 HCD Users's Guide*, SC28-1848

**Security Server (RACF):**

- *OS/390 Security Server (RACF) Planning*, GC28-1920
- *OS/390 Security Server (RACF) Command Language Reference*, SC28-1919

**APPC:**

- *OS/390 and MVS Planning: APPC/MVS Management*, GC28-1807

**RMF:**

- *OS/390 RMF User's Guide*, SC28-1949
- *OS/390 RMF Report Analysis*, SC28-1950

**UNIX System Services:**

- *OS/390 UNIX System Services: Planning*, SC28-1890
- *OS/390 UNIX System Services: Command Reference*, SC28-1892
- *OS/390 UNIX System Services: User's Guide*, SC28-1891

## **z/VM**

- *z/VM: General Information*, GC24-5944
- *z/VM: VMSES/E Introduction and Reference*, GC24-5947
- *z/VM: CMS Application Development Guide*, SC24-5957
- *z/VM: CMS File Pool Planning, Administration, and Operation*, SC24-5949
- *z/VM: CP Command and Utility Reference*, SC24-5773
- *z/VM: CMS Command Reference*, SC24-5969

## **VM/ESA**

- *VM/ESA: General Information*, GC24-5745
- *VMSES/E: Introduction and Reference*, SC24-5747
- *VM/ESA: Planning Dynamic I/O Configuration, Version 2 Release 1*, GC24-5695
- *VM/ESA: Planning and Administration*, SC24-5750
- *VM/ESA: Connectivity Planning Administration and Operations*, SC24-5756
- *VM/ESA: CMS Application Development Guide*, SC24-5761
- *VM/ESA: CMS File Pool Planning, Administration, and Operation*, SC24-5751
- *VM/ESA: CP Command and Utility Reference*, SC24-5773
- *VM/ESA: CMS Command Reference*, SC24-5776
- *VM/ESA: CPIC Communications User's Guide*, SC24-5595

## **VSE/ESA**

- *VSE/ESA General Information Introducing the System Version 2*, GC33-6626
- *VSE/ESA General Information Planning Aspects Version 2*, GC33-6628
- *VSE/ESA System Upgrade and Service*, SC33-6602
- *VSE/ESA Planning*, SC33-6603
- *VSE/ESA Installation*, SC33-6604
- *VSE/ESA Administration*, SC33-6605

## **TCP/IP**

For a WWW list, see <http://www.networking.ibm.com/tcm/tcmpubs/html>

- *TCP/IP Version 2 Release 2.1 for MVS: Planning and Customization*, SC31-6085
- *TCP/IP for MVS: Customization and Administration Guide, Version 3 Release 1*, SC31-7134
- *TCP/IP OpenEdition: Planning and Release Guide*, SC31-8303
- *TCP/IP OpenEdition: Configuration Guide*, SC31-8304
- *TCP/IP for VM: Planning and Customization Version 2 Release 3*, SC31-6082
- *TCP/IP for VSE User's Guide*, SC33-6601

## **VTAM**

- *VTAM V3R4 Resource Definition Reference*, SC31-6438
- *VTAM V4R1 for MVS/ESA, VM/ESA, VSE/ESA Resource Definition Reference*, SC31-6427
- *VTAM V4R4 for MVS/ESA, VM/ESA, VSE/ESA Resource Definition Reference*, SC31-6498
- *VTAM V3R4 Resource Definition Reference*, SC31-6438
- *VTAM V4R1 Resource Definition Samples*, SC31-6428
- *VTAM V4R2 Resource Definition Samples*, SC31-6499

- *VTAM V4R2 for MVS/ESA VM/ESA, VSE/ESA Network Implementation Guide*, SC31-6494
- *VTAM V4R3 for MVS/ESA Network Implementation Guide*, SC31-6548
- *VTAM V4R4 Network Implementation Guide*, SC31-8370

## NetView

- *TME 10 NetView for OS/390 V1R1 Application Programming Guide*, SC31-8223
- *TME 10 NetView for OS/390 V1R1 Installation and Administration Guide*, SC31-8236
- *NetView for MVS/ESA V3R1 Application Programming Guide*, SC31-8061
- *NetView for MVS/ESA V3R1 Installation and Administration Guide*, SC31-8043
- *NetView Installation and Administration Guide (VM) V2R3*, SC31-6181
- *NetView Installation and Administration Guide for VSE/ESA V2R3*, SC31-6182

## On the LANs and LAN Cables that OSA Supports

- *X3T9.5 ANSI FDDI Statement Management*, Revision 7.2, is the FDDI SMT standard
- *RFC 1231* is the TCP/IP protocol standard for IEEE 802.5 token-ring MIB
- *RFC 1398* is the TCP/IP protocol standard for managed objects for the Ethernet-like interface types
- *RFC 1483: Multiprotocol Encapsulation over ATM Adaptation Layer 5*, Section 4.1, Routed Encapsulation, is the standard used for the ATM IP Forwarding mode
- *Maintenance Information for ATM and FDDI Links*, SY27-0331
- *IBM Local Area Network Administrator's Guide*, GA27-3748
- *IBM FDDI Network Introduction and Planning Guide*, GA27-3892
- *Token Ring Network Introduction and Planning Guide*, GA27-3677
- *IBM Multisegment LAN Design Guidelines*, GG24-3398
- *IBM 8250/8260/8285 Planning and Site Preparation*, GA33-0285
- *IBM Cabling System Optical Fiber Planning and Installation Guide*, GA27-3943
- *Token-Ring Network Architecture Reference*, SC30-3374

## On the Communications Protocols that OSA/SF Uses

- *Multi-Platform APPC Configuration Guide*, GG24-4485
- *Communications Manager/2 V1.1 Network Administration and Subsystem Management*, SC31-6168
- *Communications Manager/2 V1 Workstation Installation Guide*, SC31-6169
- *TCP/IP Network Administration*, SR28-4853



---

## Chapter 1. What Is an Open Systems Adapter-2 Feature?

The IBM Open Systems Adapter (OSA-2) is an integrated hardware feature that allows the @server zSeries 900 platform to provide **industry-standard connectivity** directly to clients on local area networks (LANs). With OSA, a z900 complementary metal oxide semiconductor (CMOS) central processing complex (CPC) is an **open systems platform** that brings server resources directly to its attached networks.

Depending on its feature code (FC) and port connection, an OSA-2 supports direct z900 attachment to a token-ring LAN or a Fiber Distributed Data Interface (FDDI) LAN. The clients on the attached LAN can use the Transmission Control Protocol/Internet Protocol (TCP/IP) or the Systems Network Architecture/Application Peer-to-Peer Networking (SNA/APPN) protocol, or both. (Ethernet, Fast Ethernet, and ATM LAN attachment to the z900 is supported by OSA-Express features, not by OSA-2.)

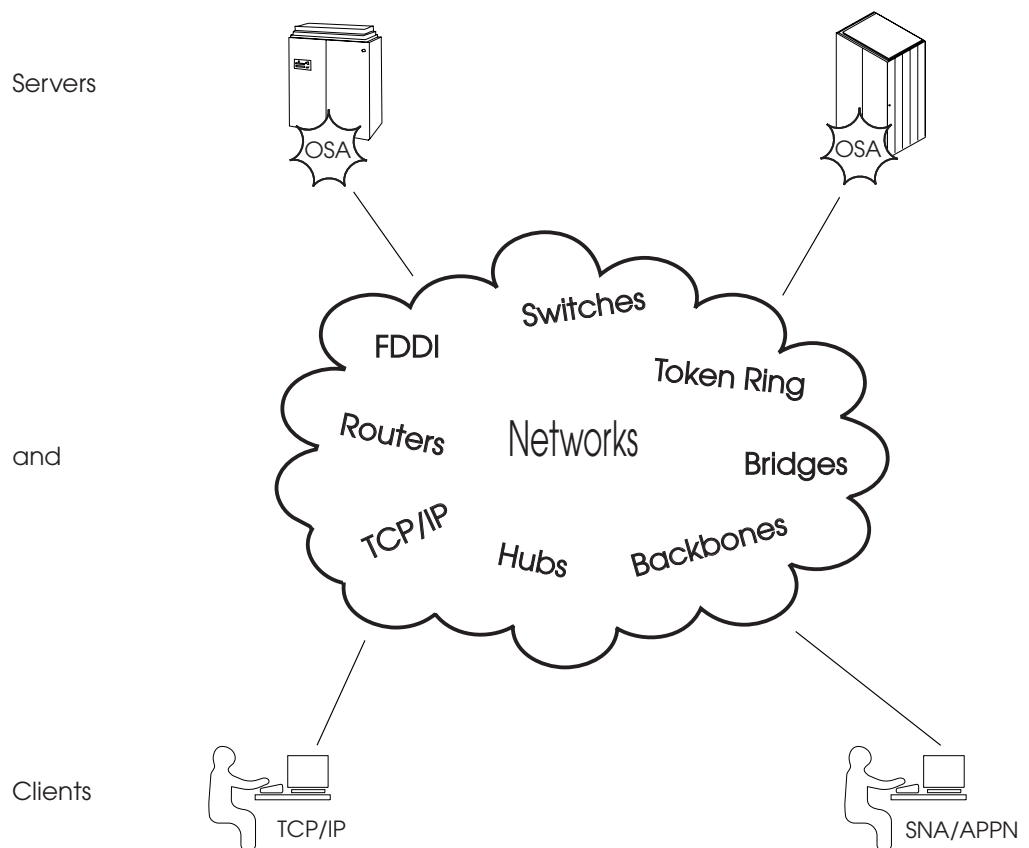


Figure 1. OSA-2 Provides Direct Industry-Standard Connectivity Between z900 and LANs

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### OSA, Its Channel Identifier, and Its Ports

**As an I/O channel**, an OSA is identified in the z900 hardware I/O configuration by its channel path identifier (CHPID). The CHPID number of the OSA on the z900 is assigned by the processor. OSA-2 features are inserted directly into the channel I/O slots of the FC 2022 I/O Expansion Cage.

**As a unique type of channel,** an OSA has one or more physical network adapters, or OSA ports. These ports can be attached directly to a LAN. This integration of channel path with network port makes OSA a unique type of a z900 channel: the OSA type.

**The proximity of an OSA CHPID slot and OSA port,** both integrated within a z900 frame, is shown in the next figure. The bezel of this OSA, which has only one physical port, has been brought out of the CHPID slot toward the middle of the figure to show the OSA port. (See Table 1 on page 23 and Table 2 on page 24 for actual port locations.) The multi-star symbol on the right is used throughout this book to represent an OSA.

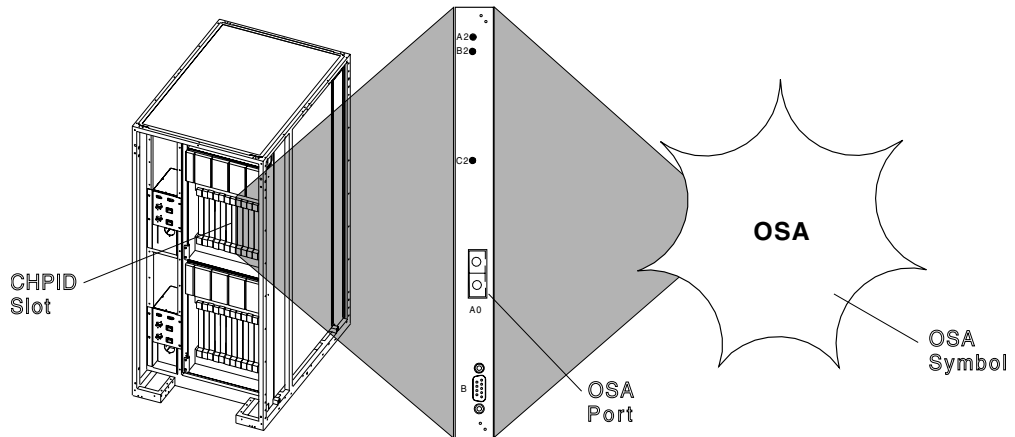


Figure 2. The Star Symbol is Used throughout this Publication to Represent the OSA-2 Feature

#### Notes:

1. If an OSA is transferring data in its SNA mode of operation, which is introduced later in this chapter, the OSA also has one virtual port. This virtual port is used only if the OSA is being monitored by an SNA network management program such as NetView, via a Box Manager node for communications with that program.
2. The OSA-2 token ring feature has two physical ports, each of which can be connected to a token-ring LAN segment. The FDDI OSA-2 has only one physical port.

## OSA Ports and Their Attached Networks

Each physical port on an OSA allows the host to be attached to a LAN or WAN through a user-supplied cable. OSA-2s are introduced in the following sections according to the networks that they support. For more information on the hardware characteristics of the OSA-2 features, refer to Chapter 2.

Take note of the following points.

- Each of the ports that allow communications with clients on a token-ring, or FDDI LAN is shipped with a world-wide unique, or universal, media access control (MAC) address. You can use this MAC address to define the OSA port on the attached LAN or use the OSA Support Facility (OSA/SF) to create and activate a locally-administered MAC address (page 128).



## Token-Ring LAN Connections

- An OSA-2 token ring feature has two ports for direct attachment to a token-ring LAN. Attachment is through only one connector on each of the two OSA-2 token ring ports. This is referred to as the bottom RJ-45 connector. See page 23 for details.

## FDDI LAN Connections

A FDDI OSA-2 has one port that can be connected either to a 100 Mbps single-ring or a dual-ring FDDI LAN. The FDDI LAN must conform to either ANSI X3T9.5 or ISO 9314. See page 24 for details.

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## OSA Modes of Operation

So far in this book, only the physical attributes of an OSA have been described: the channel path with its identifiers (CHPID), the ports, and the networks to which these ports can be attached. Through these entities, an OSA transfers data physically between host programs, or servers, and their clients on the attached networks.

Because OSA supports the Multiple Image Facility (MIF), the OSA's channel path can be defined as shared in a system that is in logically partitioned (LPAR) mode. As a consequence, an OSA can be customized to be run in some modes concurrently with different host programs sharing access to its network ports.

The following table correlates OSA-2 features with OSA modes and shows the host environments in which each mode can be run. The requisites for each host environment are listed in Chapter 3 (z/OS and OS/390), Chapter 4 (z/VM and VM/ESA), Chapter 5 (VSE/ESA).

		OSA-2 Feature	
		TR	FDDI
M O D E	TCP/IP Passthru	<b>X</b>	<b>X</b>
	SNA	<b>X</b>	<b>X</b>
	HPDT MPC (IP)		⌘

**X** = z/OS, OS/390, z/VM,  
VM/ESA, VSE/ESA

⌘ = z/OS, OS/390

*Figure 3. All OSA-2 Modes Can Run Concurrently*

## Modes for the IP Protocol

- All OSAs can be run in the TCP/IP Passthru mode (page 78) in all the system environments that OSA supports.

If an OSA is being run in this mode, it serves as an IP passthrough agent as a LAN channel station (LCS). An OSA-2 can be run in this mode concurrently with either the HPDT MPC mode, the SNA mode, or with both modes.

## Modes for the SNA Protocol

- All OSAs can be run in the SNA mode (page 101) in all the system environments that OSA supports.

If an OSA is being run in this mode, it serves as a passthrough agent for data transfer between the host programs and their SNA network clients. To assist in SNA network management, the services of the OSA support facility (OSA/SF) allow you to change the settings of the logical link control (LLC) timers. For SNA clients on Ethernet or token-ring LANs, SNA session availability options are available

A TR or FDDI OSA-2 supports event monitoring only through a VTAM box manager node.

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## z900 OSA Definitions

An OSA must be defined in the system hardware I/O configuration and to the host programs that use the OSA. The data paths between an OSA port and the z900 programs with which the OSA communicates must also be defined to the OSA as entries in its OSA address table (OAT). In addition, some of the port traffic characteristics, which are preset when the OSA is shipped, can be altered through user input.

## System Hardware I/O Configuration Definitions

In the z900 environment, an OSA is identified in the system I/O configuration data set (IOCDS), or equivalent, as an OSA CHPID with one logical control unit and a variable number of logical devices. General guidelines are provided in Chapter 2 for the different OSA modes.

In most of the examples in this book, IOCP statements are used because their succinct format lends itself to the explanations in this book. Generally, however, you would use the same program for an OSA CHPID that you use for any other type of z900 channel. For that information, refer to the system books listed in the bibliography. In a z/OS, OS/390, z/VM, and VM/ESA environment, an OSA channel can be reconfigured and its devices varied online. In a VSE/ESA environment, the OSA must be configured on and off through the standalone support element or through single object operations via the hardware management console.

***Associate one logical control unit*** for each logical partition (LP) if the system is running in logically-partitioned (LPAR) mode or one control unit if the system is in basic mode. There is no physical control unit.

***Associate a single or a pair of logical z900 device numbers***, depending on the OSA mode, for data transfer to be associated between the OSA port and a system image running in a logical partition (LP) if the system is running in logically-partitioned (LPAR) mode or for the system if it is running in basic mode. If the OSA is defined to be shared among LPs, the system images can share the logical devices.

***Define one device for the OSA Support Facility (OSA/SF)*** in each LP or share it across the LPs to which the OSA is defined so you can use that program to customize, or configure, an OSA to be run in its modes of operation. (For the limited conditions in which an OSA can be run using the default OAT without being customized by OSA/SF, see the following discussion.) The device number for OSA/SF is called the OSAD device, which name is derived from its unique device type of OSAD, or the FE device, which name is derived from its unique unit address of X'FE'.

***Associate one unit address (UA) with each device number.*** The unit address for the OSA/SF device must be X'FE'. The unit addresses for the device numbers used

for data transfer must be the IBM-supplied default UAs if the OSA is to be run in its default TCP/IP Passthru mode configuration.

## Host Program Definitions

An OSA must be defined to the z900 programs, such as eNetwork Communications Server for OS/390 (CS for OS/390), TCP/IP, and VTAM, depending on the mode of operation in which the OSA is to be run. In this OSA-centric book, only the OSA-related parameters are discussed for these program definitions to provide a framework for your OSA and OSA/SF planning. For complete information on the z900 program definitions, however, refer to the appropriate system books. The titles of some of these manuals are listed in bibliography, which is in the front of this book.

## OSA Data Path Definitions

Each data path through an OSA in each OSA mode is specified by an entry in the OSA's address table (OAT), which is stored in the OSA's nonvolatile storage. Using OSA/SF, you can add, change, and delete OAT entries in an OAT for each of the OSA's modes of operation.

### The Default OAT

Each OSA is shipped with an IBM-supplied default OAT that contains one pair of Passthru entries for each pair of inbound and outbound data paths through the OSA. These Passthru OAT entries, therefore, allow the OSA to be run in the TCP/IP Passthru mode either with or without the services of OSA/SF.

- Because a token ring OSA-2 has two ports, its OAT therefore has 64 default Passthru entries to accommodate one read and one write data path for each port for 15 logical partitions plus an "LP=0" set of entities for a system running in basic mode or if the OSA CHPID is defined to be dedicated.
- Because the FDDI OSA-2 has one port, its OAT has 32 default Passthru entries.

To define a token ring, or FDDI OSA for a default TCP/IP Passthru mode configuration, that is, a configuration in the TCP/IP Passthru mode without customization through OSA/SF, you only have to define the OSA channel path with its pairs of associated device numbers and unit addresses in the system hardware I/O configuration (IOCDS). Use the same commands or programs that you would use for any channel path (CHPID).

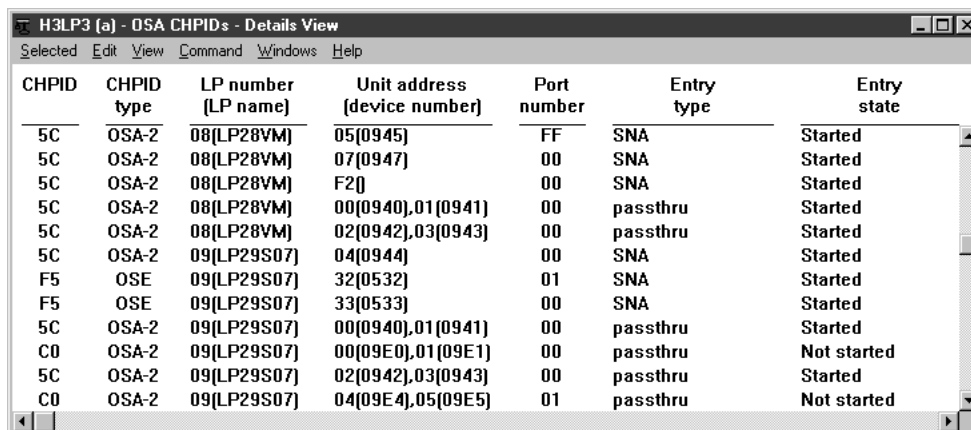
Although the services of OSA/SF are not required for a default configuration, they are still recommended. Even in a default configuration, OSA/SF can still be used to obtain data that can assist you in determining the cause of OSA-related problems. In fact, OSA/SF even lets you reinstate the OSA's default OAT and then displays these default OAT settings for you.

### Format of an OAT and Its Entries

An OAT consists of a header and up to 220 entries, or rows, that are numbered 0 through 219. Each entry consists of a base segment and an extension. The format of the base segment is common to all entries and it is discussed in the next section. The format of an OAT entry's extension depends on the OSA mode in which the data path will be used. For this reason, the OAT entry extensions are described in subsequent chapters in this book, although they are introduced under **Entry type** on page 7.

## An OAT Entry's Base Segment

The following figure is an example of the OSA/SF GUI **OSA Channels–Details View**. This displays the base segments of the OAT entries together for all the OSA CHPIDs being managed by the OSA/SF in the active host session.



CHPID	CHPID type	LP number (LP name)	Unit address (device number)	Port number	Entry type	Entry state
5C	OSA-2	08(LP28VM)	05(0945)	FF	SNA	Started
5C	OSA-2	08(LP28VM)	07(0947)	00	SNA	Started
5C	OSA-2	08(LP28VM)	F2()	00	SNA	Started
5C	OSA-2	08(LP28VM)	00(0940),01(0941)	00	passthru	Started
5C	OSA-2	08(LP28VM)	02(0942),03(0943)	00	passthru	Started
5C	OSA-2	09(LP29S07)	04(0944)	00	SNA	Started
F5	OSE	09(LP29S07)	32(0532)	01	SNA	Started
F5	OSE	09(LP29S07)	33(0533)	00	SNA	Started
5C	OSA-2	09(LP29S07)	00(0940),01(0941)	00	passthru	Started
C0	OSA-2	09(LP29S07)	00(09E0),01(09E1)	00	passthru	Not started
5C	OSA-2	09(LP29S07)	02(0942),03(0943)	00	passthru	Started
C0	OSA-2	09(LP29S07)	04(09E4),05(09E5)	01	passthru	Not started

Figure 4. Details View in OSA/SF GUI Lists All CHPIDs Managed by Active Host Session

For each CHPID, its associated device numbers are shown between parentheses preceded by the unit address that is associated with the device number. The types of OAT entries defined appear under the *Entry type* heading.

Throughout this book, labeled, black arrows are used to draw your attention to certain parameters for which you will need to provide input. The LP number, LP name, unit address, and device number are examples of these parameters that are required in an OAT entry, the system hardware I/O configuration, and the host program that serves as the endpoint of the data path described by the OAT entry.



### LP number and LP name

are the number and name of the logical partition associated with the data path specified by this OAT entry. Of course, this assumes the system is running in logically partitioned (LPAR) mode. If the system is running in basic mode, OSA/SF assumes an “LP number” of 0.



### Unit address

is displayed before each device number that is also displayed for the data path



### Device number (dev num)

is displayed as a 4-digit number that is padded with zeros if required and enclosed in parentheses. Note that the SNA mode requires only one read/write device. The other modes require separate read and write devices for the inbound and outbound data paths, respectively.

### Group size

specifies the number of entries required for both the inbound and outbound

data paths between a host program and its network clients. The group size is always automatically provided by OSA/SF.

- Group size = 1 for an SNA OAT entry because the same device reads and writes.
- Group size = 2 for a Passthru or MPC OAT entry because one device reads and one writes.
  - The entry associated with the read, or even-numbered, device specifies the inbound data path and can be modified by user input to OSA/SF.
  - The entry associated with the write, or odd-numbered, device specifies the corresponding outbound data and is automatically created when the entry for the read device is specified.

#### **Entry type**

indicates the type of extension for this OAT entry.

- An inbound/outbound pair of Passthru entries is required for each pair of read/write devices in the TCP/IP Passthru mode.
- A single SNA entry is required for each read/write device in the SNA mode.
- An inbound/outbound pair of MPC entries is required for each pair of read/write devices in the HPDT MPC mode for a FDDI OSA-2.

#### **Entry state**

indicates the device state. OSA/SF obtains the device status from the OSA.

### **Accessing an OAT**

You can view, add, change, or delete an OAT entry by using the services, or tasks, of the OSA Support Facility (OSA/SF). These tasks are often referred to as “configuring” an OSA, but this means configuring an OSA in its mode of operation. It does *not* mean configuring the OSA in the system hardware I/O configuration.

You can use the OSA/SF REXX interface, the OSA/SF OS/2 interface (GUI), or the Windows GUI (not supported on OSA/SF for VSE/ESA). Instructions on how to set up OSA/SF, download the OSA/SF GUI, and use its commands, are provided in the appropriate OSA/SF User Guides whose titles are listed in the bibliography starting on page viii.

***If you use the OSA/SF REXX interface,*** you use a locally-attached terminal for input: the TSO/E command line in a z/OS or OS/390 environment; the CMS command line in a VM environment; and an IOACMD job in a VSE/ESA environment.

***If you use OSA/SF GUI,*** you can avail yourself of the advantages of Windows or OS/2 and the workstation. Sample templates are provided in the OSA/SF IOASIOSAMP library for you to use. Furthermore, GUI can install a customized OSA mode image, or “OSA configuration”, automatically for you after you have created the image.

## **OSA Port Definitions**

Each OSA is shipped with the set of IBM-supplied default port parameters that are listed in Chapter 9. Some of these port parameters are settable through OSA/SF or at the standalone support element or single object operations via the hardware management console, or at only one of these input devices. Some port parameters, however, are not settable through user input.

- The IBM-supplied default settings for port traffic and those parameters that can be altered, or changed by user input are described for each OSA port in Chapter 9.
- A number of port parameters can be set only if an OSA is being run in the SNA mode. These parameters, which can only be set with OSA/SF, can be used to enhance SNA session availability, to change the link level control timer values, and so on. A discussion on these SNA mode port parameters starts on page 106.
- Optionally, you can use OSA/SF to define a local or group Media Access Control (MAC) address for a LAN port. You can also set a local MAC address for a physical OSA port using the standalone support element or single object operations via the hardware management console.

## OSA's Panoply of Management Services

A *panoply* is an impressive array of protective elements that is designed to safeguard the well-being of the wearer. In its dual role as a z900 channel and as a station or node in a network, an OSA is enveloped in an impressive array, or panoply, of z900 and network management services.

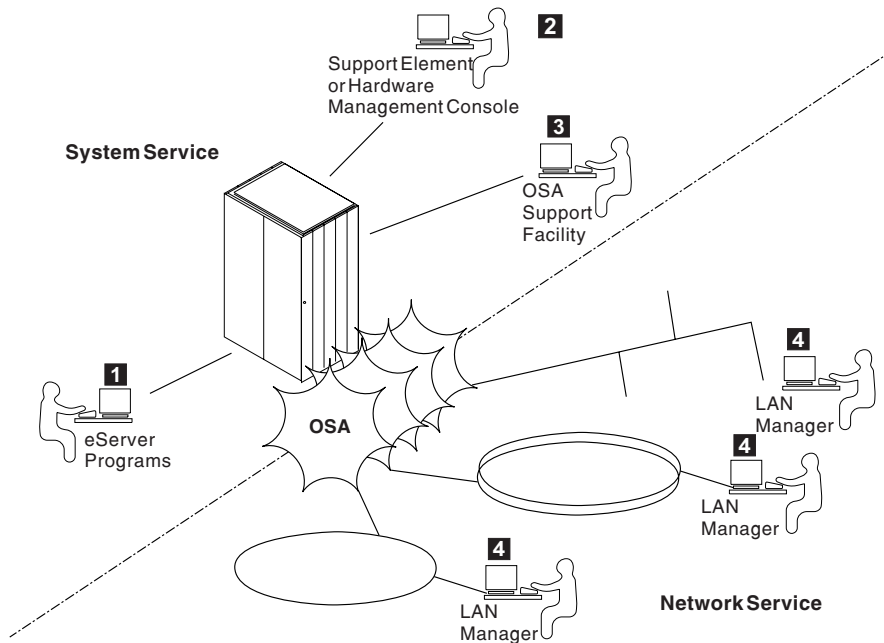


Figure 5. A Variety of Management Services are Available to OSA-2

## OSA Management by Host Programs

**1** Several host programs provide management tools for the OSA channel. For full information, refer to the program manuals listed in the bibliography. However, here are two examples.

When an OSA is being run in the TCP/IP Passthru mode, OSA LAN station (port) data can be obtained at the TCP/IP host program by the simple network management protocol (SNMPv1 and SNMPv2), which recognizes address (ESI) of the physical port. The host program can access a management information base (MIB II) to obtain data about the OSA port interfaces.



If an OSA is being run in the SNA mode, the OSA can be managed either locally or by a remote network management program. For example, the NetView program can be used to monitor status and act on the alerts sent by the OSA.

## Using the CMOS Hardware Management Console and Support Element

**2** You can use single object operations via the hardware management console of the CMOS processor or, as appropriate, the standalone Support Element, for a number of OSA-related functions. For more information, refer to the hardware and system books listed in the bibliography (page ix).

For example, data can be displayed about an OSA's physical port. You can also set a local media access control (MAC) address for a physical OSA port. (A local MAC address allows the port to be identified in a local naming convention for LAN stations and can continue to be used when one OSA is replaced by another OSA with a different universal MAC address.)

## Using the OSA Support Facility (OSA/SF)

**3** Although an OSA can be run in the TCP/IP Passthru mode without the services of OSA/SF, this program *must* be used to accomplish the following tasks:

- To customize a Passthru OAT entry so that it specifies the default data path to be used to transfer inbound IP data packets that have addresses unknown to the OSA.
- To allow the other OSAs to be run in any mode other than the TCP/IP Passthru mode in the limited conditions allowed by the default OAT settings.
- To copy an OSA/SF customization, or OSA mode configuration, from one OSA to another OSA.
- To obtain status information about the mode that is active on an OSA and about the current OSA port settings.
- To reinstate the OSA's default OAT settings and have them displayed or listed.

In z/OS and OS/390, OSA/SF runs as a base, non-exclusive element. In z/VM and VM/ESA, it runs as a VM facility (starting with VM/ESA 2.2.0), and in VSE/ESA 2.2.1, it is a VSE/ESA central function.

OSA/SF can be accessed through:

- Its OS/2 or Windows interface, which is called the OSA/SF graphical user interface (OSA/SF GUI) in this book. (The Windows GUI is not supported in OSA/SF for VSE/ESA.)
- A set of REXX Execs that the user accesses through whichever of the following that applies: Time Sharing Options Extensions (TSO/E) for OSA/SF for z/OS and OS/390; Conversational Monitor System (CMS) for OSA/SF for z/VM and VM/ESA; and REXX jobs for OSA/SF for VSE/ESA.

Through the System Authorization Facility (SAF) interface of the system image on which it is running, OSA/SF lets you use the Resource Access Control Facility (RACF), or equivalent, to deny access or to authorize up to three levels of access to OSA/SF commands in a z/OS, OS/390, z/VM, or VM/ESA environment. In a VSE/ESA environment, you use the VSE/ESA access control table DTSECTAB.

## OSA LAN Management

**4** OSA-2 supports the following types of LANs: Fiber Distributed Data Interface (FDDI), token ring, and Ethernet. As a LAN station, an OSA port responds to

LAN-level requests from LAN Managers. For example, an OSA with a FDDI LAN attachment responds to station management (SMT) 7.2 frames for management of that port. A port with a token-ring LAN connection also responds to a set of commands that allows data about the port to be viewed at a LAN Manager. Some of these port parameters can be reset by an authorized OSA/SF user as well as by a LAN manager. It is therefore important that LAN management be done by one person or closely coordinated to avoid conflicting updates.



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## Chapter 2. OSA-2 Hardware Characteristics

In this chapter, the OSA-2 is described in the context of its hardware platforms, network protocols, requirements for user-supplied cabling, and the customer-supplied definitions in the system hardware I/O configuration (IOCDS).

- FC 5201, the OSA-2 token ring feature (page 23), has two ports, each of which can be attached directly to a 4 Mbps token ring, or a 16 Mbps token ring, LAN segment. A token ring OSA-2 can be run in either the TCP/IP Passthru or SNA mode, or both modes concurrently.
- FC 5202, the FDDI OSA-2 (page 24), has one port, which can be attached to either a dual-ring or single-ring FDDI LAN. The FDDI OSA also supports an optional, optical bypass switch. A FDDI OSA-2 can be run in the TCP/IP Passthru, SNA, and HPDT MPC modes in any combination concurrently.

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### Checklist for Hardware Planning

The following checklist should help you to prepare for the installation and operation of an OSA-2. Additional checklists preface the discussions on page 29 (z/OS and OS/390), page 45 (VM/ESA), page 59 (VSE/ESA), and the discussions on each OSA mode that are provided in later chapters in this book.

- \_\_\_ 1. For each OSA, decide in which OSA modes or modes it will be run concurrently. This decision determines which OSA-specific identifiers you will need to plan for. A FDDI OSA-2 can be run in the TCP/IP Passthru, HPDT MPC, and SNA modes concurrently; the token ring OSA-2 can be run in the TCP/IP Passthru and SNA modes concurrently.
- \_\_\_ 2. Decide how many OSAs will be installed on each platform. If availability is of paramount importance, ensure that any one OSA path does not become the single point of failure.
- \_\_\_ 3. Ensure that the hardware requirements are met that are described in this chapter and in the applicable preventive service planning (PSP) buckets. For more information, refer to the hardware books that are listed in the bibliography (page ix) and your marketing representative.
- \_\_\_ 4. Ensure the site physical installation planning has been completed. See the hardware installation books listed in the bibliography (page ix).
- \_\_\_ 5. Check the EC level of the hardware platform to ensure it meets OSA requirements. To check the EC level, follow the instructions for the standalone support element or single object operations via the hardware management console.
- \_\_\_ 6. If you are applying the PTF resolution to an OSA/SF APAR, make sure the OSA is at the proper code level (page 15).
- \_\_\_ 7. Determine whether the OSA will be installed concurrently (hot-plugged) during normal hardware operations. If so, take the considerations listed on page 13 into account.
- \_\_\_ 8. For the total number of OSAs, ensure their ports can handle the projected network traffic load. Also be mindful of the maximum number of users allowed for each OSA mode as described for each OSA and OSA mode. For more information than is provided in this book, especially about redundant LAN paths, refer to *IBM Multisegment LAN Design Guidelines*, which is listed in the bibliography (page xii).
- \_\_\_ 9. Ensure the customer-supplied OSA cables are available, that space is allotted for their installation, and that they are connected properly at both ends.

- \_\_\_ 10. For each OSA port that is either directly attached to a LAN or logically attached to an ATM emulated LAN, make sure you know the active MAC address (page 128).
- If you plan to set a local MAC address, it is advisable to do so when the OSA is being installed. The reason for this is that the OSA channel path must be configured off from all the partitions to which it is defined, and then back on to all of them, before the change takes effect.
  - If the PTF resolution to the proper OSA/SF APARs is applied, a local MAC address can be set with OSA/SF. See the requirements for each system in the following chapters.  
Otherwise, you can set a local MAC address only using the standalone support element or single object operations via the hardware management console.
  - If you are specifying a token ring OSA-2 port connected to a token ring LAN, or a FDDI OSA-2 port for the SNA session availability options in the SNA mode (page 109), you must define the same local MAC address for ports for which you have specified interdependent options.
- \_\_\_ 11. Define each OSA CHPID and its associated control unit and devices in the system hardware I/O configuration (IOCDS). Make sure these data items are provided to the personnel who define the CHPID to the z900 system and to OSA/SF as well.  
OSA CHPIDs for your CPC should be available in the Support Element display or the IBM Configurator (CFSYSTEM) *Placement Report* and *CHPID Report*, which should be available from your marketing representative.
- \_\_\_ 12. Review the OSA port parameters, especially the settable port parameters that are listed in Chapter 9 and, for the SNA mode, the SNA session availability options (page 106).
- \_\_\_ 13. Each OSA mode places requirements for frame protocols and maximum number of users. See page 75 for the OSA modes that use the IP protocol, page 101 for the SNA mode.
- Logical level control (LLC) timers (T1, Ti, and T2) and the maximum I frames and transmit window counts (N3 and TW) can be set (page 106).
  - A FDDI OSA-2 port, and a token ring OSA-2 port that is attached to a token ring LAN can be used to enhance the availability of SNA sessions (page 106).
- \_\_\_ 14. For a token ring OSA-2 (FC 5201), each of its two ports can be connected to a token ring LAN. Each port has three connectors on its bezel. Refer to the information that starts on page 23, especially:
- Keep the wrap plugs in case they are needed for service tests,
  - If the bottom RJ-45 connector on a token ring OSA-2 is connected to a token ring LAN via a switch for full duplex communications and you specify an MTU size greater than 4K, make sure the token ring switch to which the OSA is attached can handle the maximum transmission unit (MTU), or maximum data packet size.
  - Make sure the requirements for the duplex mode are met and that both ends of the link segment are set properly.
- \_\_\_ 15. For a FDDI OSA-2 (FC 5202), check the information starts on page 24, especially:
- Decide whether to use an optional, optical bypass switch. If so, plan to have the switch operational before the FDDI OSA is online (page 26).
  - Check whether an FCS jumper cable will be needed (page 25).

- Make sure the FDDI OSA port is connected properly to either a single- or dual-ring FDDI LAN.

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## Checklists for Installing or Moving an OSA

An OSA-2 feature can be installed concurrently, or “hot plugged” on the z900 platform that the OSA supports. An OSA-2 feature can also be moved between CHPID slots on the same processor as long as both CHPID slots are valid for the OSA.

To define the OSA CHPID in the system hardware I/O configuration (IOCDS), you should generally follow the same guidelines that apply to other CHPIDs. Additionally, you may want to copy the OSA mode configuration of an OSA that is already installed. The following checklists should help you to organize this activity. Depending on your site requirements, of course, you may need to add, delete, or change some of the items on these lists.

### Pre-Installation Checklist

- \_\_\_ 1. Make sure the OSA code level on the Support Element of the CMOS processor supports the functions that you want the OSA to perform (page 15).

- \_\_\_ 2. Make sure the pre-requisites and requisites are met for the modes in which each OSA will be run.

If OSA/SF is to be used, make sure that the PTFs to the relevant OSA/SF APARs are applied. Check the requirements listed in Chapter 3 (OS/390 and z/OS), Chapter 4 (VM), or Chapter 5 (VSE/ESA).

Remember that:

- OSA/SF is required for any other OSA to be run in any mode that the OSA supports except the TCP/IP Passthru mode.

However, these OSAs can then be run in the TCP/IP Passthru mode only under the following limited conditions. Access to an OSA port cannot be shared among logical partitions, and the IBM-supplied default unit addresses must be defined in the system hardware I/O configuration (IOCDS). These values are X'00' and X'01' for the device pair defined for port 0. Since a token ring OSA-2 has two ports, its default OAT is shipped with the IBM-supplied default unit addresses X'02' and X'03' for port 1 also.

- \_\_\_ 3. For a token ring OSA-2, make sure the speed (4 or 16 Mbps) and duplex mode match the settings at the adapter (page 23).

Make sure the correct table is installed for each port and remember to remove the wrap plugs from those connectors not being used. For a new installation, make sure either you or the service representative selects “Autosense on next reset” from the OSA Advanced Facilities screen.

- \_\_\_ 4. Define the OSA channel path in the system hardware I/O configuration (IOCDS) as an OSA CHPID with its associated control unit. Associate the device numbers depending on the mode or modes in which the OSA will be run.

Remember that:

- It is especially important to define an OSA CHPID if the OSA is being installed concurrently, that is, if it is being “hot-plugged” into the system.
- If OSA/SF is to be used, make sure it is managing the OSA and that the OSAD device number with unit address X'FE' is defined.

- For devices defined for the TCP/IP Passthru mode, ensure the missing interrupt handler (MIH) is set off (0).
- \_\_\_ 5. If you plan to move an OSA feature to a different slot on the same z900 processor, or to change the CHPID number assigned to the OSA feature, or both, consider copying the OSA's configuration (page 16) so that the new CHPID will be set up for those modes of operation. Activate the copied configuration using the OSA/SF **Activate No Install** command. Do not instruct OSA/SF to download, or install, the copied configuration until **after** the OSA feature has its new CHPID number assigned.
- When moving an OSA feature and reassigning the same CHPID number, there is no need to copy the configuration.
- \_\_\_ 6. If the OSA is to be run in the TCP/IP Passthru mode:
- And if the default OAT is used (page 5), make sure the IBM-default unit addresses are associated with the device numbers that you define in the system hardware I/O configuration (IOCDS) (page 80).
  - Update the TCP/IP profile to include a list of the authorized user IDs that can issue the Obeyfile command. A generalized format is shown below. For more information, refer to the TCP/IP or CS for OS/390 books listed in the bibliography (page xi).
- ```
obey
userid1 userid2 ...
endobey
```
- Add the OSA to the TCP/IP profile now or after the OSA is installed.
- For information on the OSA-specific parameters in this book, see the discussion that starts on page 85. For complete information, see the TCP/IP and CS for OS/390 books listed in the bibliography (page ix).
- \_\_\_ 7. If the OSA is to run in any other mode, ensure that the requirements for that mode are met as described in this book; that the device numbers are associated with the OSA CHPID properly; and that OSA/SF is available to use to customize the OSA. After the OSA is installed, use OSA/SF to activate and install the mode image on the OSA.

## Installation Checklist

- \_\_\_ 1. Make sure that all the required planning is completed. For a minimum list, see the previous section.
  - \_\_\_ 2. Call the IBM service representative to install or move an OSA feature.
  - \_\_\_ 3. Make sure the service representative is provided with the IOCDS definitions, the setting of the duplex mode, if applicable, the speed settings, etc.
  - \_\_\_ 4. Check whether the OSA-2 arrived with a miscellaneous equipment specification (MES). If so, the OSA physical installation instructions are included in the MES package.
- If an MES does accompany the OSA, the OSA must not require the installation of other hardware, such as an FIB card or STI cable, that would prohibit concurrent installation.

## Post-Installation Checklist

- \_\_\_ 1. Ensure that each OSA port is connected to the proper cable. Keep the wrap plugs in case they are needed for service tests.
- \_\_\_ 2. Bring the OSA channel path (CHPID) online as you would any other channel type. Refer to the hardware and system books listed in the bibliography (page ix).

- \_\_\_ 3. Vary the OSA devices online that have been specified. If the devices do not come online automatically, they should be varied on manually, but **it may take up to 5 minutes for all the OSA devices associated with an OSA CHPID to come online.**
- \_\_\_ 4. If the OSA has been moved from another CHPID slot on the same CMOS processor and you copied its configuration of OSA modes, issue the OSA/SF ***Install*** command to download the copied configuration on to the OSA in its new CHPID slot.
- \_\_\_ 5. If the OSA is to be run in the TCP/IP Passthru mode:
  - Add the OSA to the active TCP/IP profile or analogous TCP/IP statement by using the Obeyfile command against the active TCP/IP profile that was just updated with the OSA-2 device numbers. Refer to the TCP/IP or CS for OS/390 books listed in the bibliography (page xi).
  - If the OSA has not yet been defined to TCP/IP, ensure that this is done. In this book, see page 85, but for complete information, refer to the TCP/IP or CS for OS/390 books listed in the bibliography (page xi).
- \_\_\_ 6. If the OSA is to be run in any mode other than the TCP/IP Passthru mode, ensure that all the definitions are in place that are described in subsequent chapters for that mode. Ensure the mode image, which has been customized by using OSA/SF, is installed and activated on the OSA. Refer to the appropriate *OSA/SF User's Guide* that is listed in the bibliography (page vii) for instructions.
- \_\_\_ 7. Notify operations personnel that the OSA can access the logical partitions (LPs) if the system is running in logically-partitioned (LPAR) mode or the system in basic mode for which it has been defined and customized.

---

## OSA Channel Path Characteristics

As a z900 I/O channel, an OSA feature is included in all the terms and conditions associated with any z900 OSA hardware feature on the z900 hardware platforms that it supports. An OSA is a field-installable feature.

## OSA CHPID Slots

OSA-2 CHPID assignments depend on the total number of channels installed in the system. For more information that listed in the following table, refer to the hardware books listed in the bibliography (page ix), and to the CHPID report provided by your account team.

**Note:** Each OSA-2 is assigned one CHPID number by the processor. This number can be changed or reassigned by the IBM Customer Engineer.

## OSA Machine Type

Although you do not define an OSA channel by its machine type, it is worth noting that an OSA channel and device have the machine type of 9676. This information is stored in the OSA channel's node descriptor (ND) and the device node element descriptor (NED). These sources are used by some programs. For example, the ESCON Manager program displays the OSA machine type in its notebook page. OSA or 9676 is displayed in the type field. The model field displays 002 for both the FDDI and token ring OSA-2.

## OSA Code Level

- For an OSA APAR, check the cover letter of the PTF resolution.
- Consult your service representative.

Information on OSA is available on the *OSA PE Home Page* at URL <http://icpe.pok.ibm.com>. OSA levels are listed on [icpe.pok.ibm.com/lic.htm](http://icpe.pok.ibm.com/lic.htm). Also, look in RETAIN for document H00553 in the HSF (tip) database.

- For general information on EC levels of the CPC, refer to the hardware manuals listed in the bibliography and the applicable IBM preventive service planning (PSP) buckets, such as 2064DEVICE, and the OSA/SF PSP buckets that are listed for each host system in the subsequent chapters.

## OSA Configuration Data

Configuration can mean either channel path configuration as defined in the system hardware I/O configuration data set or the configuration of an OSA mode of operation as defined in the OSA address table (OAT).

### Channel Path (CHPID) Configuration

To define an OSA channel path with its associated, logical control unit and devices, use the system commands and instructions that you would use for any other type of channel. As a z900 channel path, an OSA must be defined in the system hardware I/O configuration data set (IOCDS). The OSA-related parameters are discussed starting on page 17. Note that the devices that are required depend on each mode of operation in which the OSA will be run.

### OSA Address Table (OAT) Configuration

Each OSA has an OSA address table (OAT) in its non-volatile storage. Each entry in the OAT specifies a data path between a z900 program that is running on a system image to which the OSA is defined and an OSA port. Each OSA is shipped with a default OAT as discussed on page 5.

***You can customize the entries of an OAT, or “configure” an OSA in its modes of operation*** using OSA/SF. The OSA/SF customization, or configuration, parameters are discussed in detail for each OSA mode in Chapter 6 (IP protocol), and Chapter 7 (SNA mode). OSA/SF can also be used to customize an OSA port for its traffic parameters as discussed in Chapter 9. SNA mode port parameters are discussed on page 106.

***You can also copy an OAT’s configuration*** using OSA/SF. This means that you can duplicate one OSA’s mode or modes of operation to another OSA or to the same OSA if that OSA is to be moved from one CHPID slot to another on the same processor. You must, of course, still define the OSA in the system hardware IOCDS, to the z900 host programs, make any amendments to the OSA/SF panels, and activate the configuration for the new OSA.

## CHPID Management Guidelines

- As an I/O channel with associated devices, an OSA is subject to the same problem determination procedures that apply to any other type of z900 channel. For information on hardware procedures, refer to the books on each hardware platform that are listed in the bibliography.

Although the high availability with which OSA has been designed makes channel failure unlikely, such a possibility should be considered in the planning of your general management of an OSA in its network traffic.

For example, by designing alternate connections for host-to-network and server-to-client traffic, you can prevent the OSA features in your enterprise from being candidates for single point of failure.



- If an OSA memory dump or trace is required for the resolution of a problem, this is generally identified in an OSA/SF message or the OSA console log that OSA/SF can be used to access.  
If and when you are directed by support personnel to do so, you can take a dump of an OSA using OSA/SF. For more information, refer to the OSA/SF user's guide listed in the bibliography (page vii).
- An OSA LAN port can be managed by the LAN management tools available to the LAN administrator.  
Note, however, that OSA/SF also provides many port statistics. In this book, these are listed in Chapter 9 as they would be presented by the OSA/SF GUI interface (OS/2 or Windows).
- If port diagnostics must be run, remember that an OSA is a z900 channel type. The OSA CHPID must be configured online, and then LAN traffic to the port must be stopped.  
If OSA/SF is managing the OSA, the associated entries in its OSA address table, or OAT (page 6) is useful when ascertaining the status of the devices associated with the port.
- Some hardware failures are disruptive only to the port, and you would prefer to disable the port without configuring the channel off. You can do this using OSA/SF, the standalone support element or single object operations via the hardware management console. The OSA/SF commands and panels are described in the OSA/SF user's guides that are listed in the bibliography (page vii).

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## OSA IOCDS Definitions

Using the I/O configuration program that you would use for any z900 channel path, define each OSA in the system hardware I/O configuration (IOCDS). The resource (page 18), CHPID (page 18), and control unit (CU) (page 20) are discussed in this chapter together with the OSAD device for communications with OSA/SF (page 21) and an introduction to OSA device management.

Describing the I/O configuration programs and components in detail for each z900 system that OSA supports is beyond the scope of this book, although an example is shown in this section using IOCP statements and other examples are shown in subsequent chapters. For complete information, however, refer to the IOCP, z/OS, OS/390, VM/ESA, and VSE/ESA books listed in the bibliography (page ix). (In a VSE/ESA environment, IOCP must be used.)

**Labeled arrows are used throughout this book.** This is done to draw attention to an OSA-related parameter. The following numbered arrows are used on the parameters that relate to the OSA's definition in the system hardware I/O configuration.

IOCP statements are used in the examples because their format is concise, not because they show complete statements nor because their use is recommended. The example is a token ring OSA-2 with CHPID X'80' being run in the TCP/IP Passthru mode under OSA/SF management. Note that hexadecimal notation (for example, X'80') is generally shown as 80 because it is assumed that you know which channel subsystem values must be provided in hexadecimal notation and which, such as the count values, must be entered in decimal notation.

|                                                                                                                    |                                                           |
|--------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|
|  Logical partition number         | RESOURCE PART=((LPLEFT,1),(LPRIGHT,2))                    |
|  Channel path                     | CHPID PATH=80,TYPE=OSA,SHARED                             |
|  Control unit                     | CNTLUNIT CUNUMBR=100,PATH=80,UNIT=OSA                     |
|  Device number                    | IODEVICE ADDRESS=(8000,4),CUNUMBR=100,UNIT=OSA,UNITADD=00 |
|  Unit address for a device number |                                                           |
|  OSAD (OSA/SF) device and UA      | IODEVICE ADDRESS=(800F),CUNUMBR=100,UNIT=OSAD,UNITADD=FE  |

You can specify a unit address implicitly by the decimal count. If you are using the IBM-supplied default UAs, however, you can only do so if the last two digits of the lowest device number are 00.

   
IODEVICE ADDRESS=(8000,4),CUNUMBR=100,UNIT=OSA

## Logical Partition (RESOURCE PART=)

- If the system is running in logically partitioned (LPAR) mode, specify the logical partition (LP) names and the LP numbers (LP #) in a RESOURCE PART= statement.
- In the examples in this book, the hypothetical processor has two logical partitions, LPLEFT (LP 1) and LPRIGHT (LP 2). In IOCP format, the LPs for the examples in this book would be specified in the RESOURCE statement as:

  
RESOURCE PART=((LPLEFT,1),(LPRIGHT,2))

## OSA Channel Path (CHPID PATH=)

Define an OSA channel path as one of the following:

- Basic mode for a system that is running in basic mode. OSA/SF assumes an LP number of 0, so you must specify 0 to OSA/SF for OAT entries if the system is in basic mode.
- Dedicated (not shared) for a system that is running in logically-partitioned (LPAR) mode. Because the OSA is dedicated to one logical partition (LP), OSA/SF can determine that LP from the IOCDS and, therefore, needs no user input. For an OAT entry in this case, specify LP=0 to OSA/SF.
- Reconfigurable dynamically between LPs. OSA/SF can determine the active LP from the IOCDS and, therefore, needs no user input. For an OAT entry in this case, specify LP=0 to OSA/SF.
- Shared among the LPs. In this case, OSA/SF cannot determine the active LP and, therefore, requires you to enter the LP number if you create an OAT entry.

In the examples in this book, an OSA channel path is always shared between LPLEFT and LPRIGHT, so you would specify in IOCP format:



  
CHPID PATH=80,TYPE=OSA,SHARED

**Notes:**


1. It is advisable to define an OSA only to those LPs that will use the OSA.

For an OSA that is defined as reconfigurable or shared, this can be achieved by defining a CHPID candidate list. The OSA will then be brought online after a Power-On Reset (POR) only to the LPs, or candidates, that are in the CHPID's candidate list.

For complete information, refer to *IOCP User's Guide*, which is listed in the bibliography (page ix).

Suppose, however, that the processor used in the examples in this book had three LPs instead of two and that the OSA is still defined only to LPLEFT (LP 1) and LPRIGHT (LP 2). LPNOTOSA (LP 3) is not used by OSA.

You would restrict the OSA to LP 1 and LP 2 in the candidate list that is shown in the following example. The LPs are specified in the initial access list '(LPLEFT,LPRIGHT)'. '(=)' specifies the candidate list.

  
RESOURCE PART=((LPLEFT,1),(LPRIGHT,2),(LPNOTOSA,3))  
CHPID PATH=80,TYPE=OSA,PART=((LPLEFT,LPRIGHT),(=))

2. Define the type as OSA except in a VM/ESA environment prior to VM/ESA 2.1. In VM/ESA Version 1, an OSA is recognized as a channel-to-channel adapter, or CTCA, so either do not specify the device type or define it as CTCA.
3. The OSA is listed in the channel type column of the IOPD status frames. FDD stands for a FDDI OSA-2 and TOK stands for a token ring OSA-2 port attached to a token ring LAN.  
The IOPD status frame can be viewed using the standalone support element or single object operations via the hardware management console. Refer to the CMOS Operations Guides listed in the bibliography (page ix).
4. Although the OSA machine type, which is 9676, is not specified to the channel subsystem, some programs display it (page 15).
5. For OSA/SF to manage an OSA, the OSA channel path must be operational and online to the LP in which the managing OSA/SF is running.
6. To obtain OSA channel status, use the system commands and services that are used for other I/O channel types.  
In addition, OSA/SF can present channel status about the OSAs under its management. OSA/SF gathers data from the channel subsystem, including the status of an OSA channel path, and lists this data in the base segments of the OAT entry that is associated with each unit address and partition number (page 5).
7. To configure an OSA channel on and off, use the same system commands and services that are used for other host channel types.
  - In a z/OS or OS/390 environment, you can use either the system commands directly or indirectly through the ESCON Manager Remove Chp and Restore Chp commands. ESCON Manager can also be used to display OSA channel, control unit, and device status.

- In a VM/ESA environment, use the Dedicate statement in the VM/ESA directory or instruct the system operator to enter the Attach command to dedicate each OSA device to the appropriate virtual machine.
  - In a native VSE/ESA environment, use the standalone system element or single object operations via the hardware management console.
8. If an OSA CHPID that is online must be configured off, you must configure the CHPID off to all the partitions to which the OSA is defined. To bring the CHPID back online, it must be configured on to all the partitions to which it is defined in the hardware configuration.

For example, you must do this if:

- A local MAC address (page 128) is to take effect.
- An OSA mode has been installed or changed on the OSA with the OSA/SF Install command in order for the OSA-mode configuration to be activated.
- A FDDI OSA-2 optical bypass switch is to be made operational while the FDDI channel path is already operational.
- Some port parameters you set using OSA/SF.

## OSA Control Unit Number (CUNUMBR=)

Although there is no physical OSA control unit, you must assign a logical control unit to each OSA channel path to allow the OSA device numbers and unit addresses to be associated with the OSA port or ports.

Specify one control unit, setting the type to OSA, and specify only one path for this control unit. You do not need to specify the range of unit addresses because an OSA control unit recognizes unit addresses in the range X'00'–X'FE'.

In the following IOCP example, therefore, the UNITADD parameter for the OSA control unit is not specified. If you are using an HCD panel or a VM/ESA dynamic I/O configuration command, check the publications listed in the bibliography (page ix) for complete information.

In HCD, for example, the unit address field defaults to 00 for a count of 255.



```
CNTLUNIT CUNUMBR=100,PATH=80,UNIT=OSA
```

## OSA z900 Device Numbers (IODEVICE=, ADDRESS=)

Associate a number of logical device numbers with the z900 channel path for communications with the programs running in that LP (or system). There are no physical devices attached to an OSA.

Except for those devices used to communicate with OSA/SF, and through a Box Manager node with NetView, a z900 logical device is defined for data transfer through an OSA port. Each OSA mode of operation has a requirement for either one or for an even/odd, read/write pair of devices per port. These device numbers are described on page 80 (TCP/IP Passthru mode), page 93 (HPDT MPC mode), and page 103 (SNA mode). The device type (UNIT=) should be OSA.

As with any other CHPID, you would assign a block of device numbers that fits the configuration of your installation. In this book, a block of 16 devices has been assigned that is not only completely untypical, but includes devices for all the OSA modes, which no one OSA can support. These device numbers were chosen only

to demonstrate all the OSA modes economically in the examples in this book. The format for the device numbers used in this book is *xyyy*, where *xx* is the CHPID and *yy* equates with the unit address for each device number with the exception of the OSAD device in which *yy* must be X'0F'.

### Notes on Unit Addresses

1. Associate a unit address for each device number that you specify in the system hardware I/O configuration (IOCDS). In this book, the unit addresses are specified explicitly, but they can be specified implicitly as the last two digits of the corresponding device numbers. The difficulty with such implicit definition, however, is that you increase the likelihood of defaulting to an incorrect unit address.
2. You must specify the unit address to OSA/SF that you specified in the IOCDS. OSA/SF correlates the unit address with the appropriate OAT entry and device number. If an OSA mode requires an even/odd, read/write pair of device numbers, OSA/SF requires only the unit address of the even (lower) device number.
3. Specify a unit address from X'00' through X'FD' and a device type of OSA for any device except the OSAD device for communications between the OSA and OSA/SF.
4. Specify X'FE' as the unit address and a device type of OSAD for OSA/SF communications.
5. In the TCP/IP Passthru mode, it is recommended that you associate X'00' and X'01' as the unit addresses for the device pair for data transfer across port 0. For a token ring OSA-2 that has two physical ports, it is recommended that you associate X'02' and X'03' as the unit addresses for the device pair designated for data transfer data over port 1.  
  
In fact, you must specify these unit addresses if OSA/SF is *not* to be used to customize the OSA in this mode.
6. The following unit addresses are used in the examples in this book. These unit addresses equate with the last two digits of the corresponding device number with the exception of the device number used for communications between the OSA and OSA/SF. In the examples in this book, all the OSA channel paths are defined to be shared across logical partitions.
  - X'00'–X'03' for the two even/odd, read/write pairs of devices for data transfer across ports 0 and 1, respectively, in the TCP/IP Passthru mode.
  - X'04'–X'05' for the single device numbers needed for data transfer across ports 0 and 1, respectively, in the SNA mode.
  - X'06'–X'07' for the read/write device pair for data transfer across the single, physical port (port 0) of the FDDI OSA-2 being run in the HPDT MPC mode.
  - X'0E' for the device number for communications with NetView via the Box Manager node when an OSA is being run in the SNA mode.
  - X'FE' for the device number X'xx0F' for communications with OSA/SF in any OSA mode.

### Notes on the OSA/SF (OSAD) Device

1. To allow an OSA to communicate with OSA/SF, either specify a device number for that OSA to one logical partition or, by omitting the partition parameter, specify a device number that permits OSA/SF running in any partition in the same z900 platform to communicate with the OSA.
2. Specify one device number with UNIT=OSAD and associate a unit address of X'FE' with this device number. This device is called the OSAD device in this book as a reminder that its type must be specified as OSAD. However, its other aliases are the FE device, diagnostic device, and OSA-agent device.

- OSA/SF must be running in the system, but not necessarily in any of the partitions to which an OSA user device has been defined. OSA/SF must be able to access the OSAD device (page 34).
- For example, you could specify device 800F for communications between an OSA CHPID and OSA/SF in the IOCP format as:

IODEVICE ADDRESS=(,CUNUMBR=100,UNIT=,UNITADD=FE

## Notes on OSA Device Status

- Use the regular system operating commands. Note that OSA/SF lists the device numbers in its OSA address table (OAT) entries.
  - In a z/OS or OS/390 environment, you can also use the OSA/SF Get Table command, the OSA/SF GUI panels, and the ESCON Manager commands.
  - In a VM/ESA environment earlier than VM 2.1, an OSA device is listed or displayed as a channel-to-channel adapter (CTCA). Therefore, either do not define an OSA on those releases, allowing VM to define it implicitly as a CTCA, or define it explicitly as a CTCA.
- Vary an OSA device off or on.**
  - In a z/OS or OS/390 environment, you can use either the system commands directly (for example, VARY DEV ONIOFF) or indirectly through the ESCON Manager commands. ESCON Manager can also be used to display OSA device status.
  - In a VM/ESA environment, use the regular VM system commands that are used for other types of devices.
  - In a VSE/ESA environment, you can use the OFFLINE (*cuu/chpid*) and ONLINE (*cuu/chpid*) commands, but would more likely take the CHPID and its associated devices offline at the system hardware management console.

**OSA LED Status Indicators:** See pages 23 and 24 for LED locations.

| Not Operational<br>(Top Indicator) | Test Complete<br>(Middle Indicator) | Offline Status<br>(Third Indicator) | OSA Status                                                        |
|------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------------------------------------|
| Off                                | Blinking                            | Off                                 | OSA is operational; control unit and at least one port are online |
| Off                                | Blinking                            | On solid                            | OSA is operational, but control unit or port is not online        |
| Off                                | Off                                 | On solid                            | OSA channel path is offline                                       |
| Off                                | Off                                 | Off                                 | Either no power to the OSA or severe hardware error detected      |
| Blinking                           | Off                                 | Off                                 | Power-on self-test is running                                     |
| On solid                           | Blinking                            | On or off                           | Hardware error detected                                           |
| On solid                           | Not blinking                        | On or off                           | Severe hardware error; OSA stopped                                |

## OSA-2 Token Ring Feature (FC 5201)

A token ring OSA-2 can be run in either the TCP/IP Passthru or SNA mode, or in both modes concurrently. Both these modes are available on all the host platforms that OSA supports.

As the figure in Table 1 shows, a token ring OSA-2 (FC 5201) has two ports, one below the other. Each port has three connectors, only one of which can be plugged to a cable or wrap plug at a time. If more than one connector is plugged, the results are unpredictable. Keep all 6 wrap plugs available, however, in case they are needed for service tests.

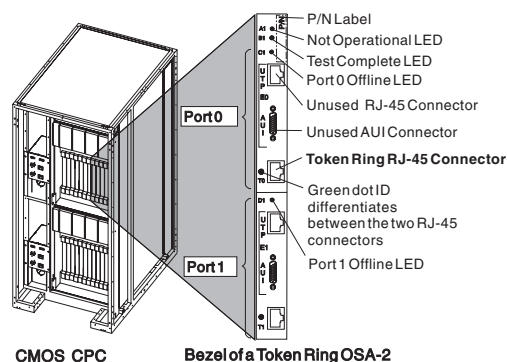
For *each* port:

- The *top* RJ-45 connector and *middle* 15-pin “D” shell connector are unused.
- The *bottom* 8-pin RJ-45 connector attaches the port to a token ring LAN through either a shielded twisted pair (STP) or an unshielded twisted pair (UTP) interface.

Table 1. The Token Ring OSA-2 Has Two Ports

You should use strain relief (P/N 07H6824 for a maximum of 10 cables) to secure the cables at the tailgate of the frame.

The status conditions indicated by the LEDs are listed on page 22.



## Notes on the Bottom RJ-45 Token Ring Connector

The single token ring connector is the **bottom**, or lower RJ-45, connector, on the bezel of each token ring OSA-2 port.

1. **Autosensing the LAN speed:** At initialization, the token ring OSA-2 LAN adapter (port) auto senses and conforms to the speed of the token ring (4 Mbps or 16 Mbps) and whether communications are in full or half duplex. If no carrier is sensed on the ring, the adapter enters the ring at the speed of its last successful entry.
2. **For half-duplex communications:**
  - Attach the port to a half duplex 4 Mbps or 16 Mbps token ring LAN that conforms to the IEEE 802.5 (ISO/IEC 8802.5) standard.
  - between logical partitions (LP-to-LP data transfer) on the same CPC, either attach this connector to a LAN or cover it with a wrap plug.

For LP-to-LP communications, the port must be defined to both logical partitions. Port-sharing must be defined for the OSA mode, which is to say, access to the port must be defined through OSA/SF to be shared between the two LPs in this mode.
3. **For full-duplex communications:**
  - Attach the port via a full duplex switch, such as the 8272 N Ways Token Ring switch, to a 4 Mbps or 16 Mbps token ring LAN that conforms to the IEEE 802.5 (ISO/IEC 8802.5) standard.

- LP-to-LP communications are not supported.
  - Set the switch for full duplex communications. Do not set the token ring OSA-2 port because it autosenses as stated above.
4. **Cabling:** Installation-dependent factors determine the cabling requirements for the token ring RJ-45 connector to the customer's token ring Multistation Access Unit (MAU or MSAU).
- The RJ-45 connector supports either a standard shielded twisted pair (STP) cable or an unshielded twisted pair (UTP) cable. For more information on these cables, refer to *Token Ring Network Introduction and Planning Guide*, which is listed in the bibliography (page xii).
- To attach the RJ-45 connector to an alternate connector type, you can use:
- IBM P/N 60G1063 (RJ-45 to ICS data connector)
  - IBM P/N 60G1066 (RJ-45 8-pin to a 9-pin subminiature "D" shell receptacle)
5. **Wrap plug:** Starting with EC E95874, TR wrap plug, P/N 08J5792, is provided.

## Frame Protocols and Maximum Number of Users for Token Ring

If you specify a maximum transmission unit (MTU), or maximum data packet size, greater than 4K for a token ring connection, first make sure that the MTU size is supported by the switch.

- **In the TCP/IP Passthru mode**, the maximum number of users depends on the maximum number supported by the host TCP/IP program. The following token ring frame protocol is supported:  
Token ring 802.5 using the 802.2 envelope with SNAP
- **In the SNA mode**, the highest number of PUs supported is 2047, which requires the PTF resolution of the appropriate APAR. See page 31 (OS/390), page 47 (VM/ESA), or page 63 (VSE/ESA). If 2047 PUs are not supported, the maximum number is 255 PUs.

The following frame protocol is supported:

IEEE 802.2 LAN MAC (802.5 using the 802.2 envelope).

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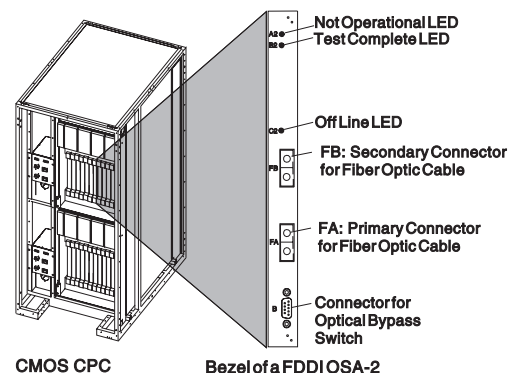
## FDDI OSA-2 Feature (FC 5202)

A FDDI OSA-2 can be run in the TCP/IP Passthru, SNA, and HPDT MPC modes concurrently in any combination in an OS/390 environment. It can be run in the TCP/IP Passthru and SNA modes concurrently in any combination in the other environments that OSA supports.

Table 2. The FDDI OSA-2 Has One Port

The upper (FA) and middle (FB) connectors on a FDDI OSA-2 card allow the card's FDDI port to support either one or two (for redundancy) FDDI paths. In the FDDI port parameters, these connectors are themselves called ports, *port a* and *port b*.

The status conditions indicated by the LEDs are listed on page 22.





## Fiber-Optic Cabling

A FDDI OSA-2 feature (FC 5202 or 5203) consists of one card with one OSA LAN port. That port can be connected via user-supplied cabling either to a 100 Mbps single- or dual-attachment FDDI LAN. The FDDI LAN must conform to either the American National Standard Institute (ANSI) X3T9.5 specification or the International Standards Organization (ISO) 9314 specification.

### Notes:

1. The cable part numbers (PNs) provided in this chapter are provided as examples only. For up-to-date and specific information, see your IBM representative and refer to *Maintenance Information for ATM and FDDI Links*, which is listed in the bibliography (page xii) or the appropriate Technical Service Letter (TSL). Fiber installation services are available from the IBM Availability Services (AS) division.
2. The OSA fiber optic modules are certified in the USA to conform to the requirements of DHHS 21 CFR subchapter J for Class 1 laser products. Elsewhere, they are certified to be in compliance with IEC 825 (first edition 1994) and CENELEC HD 482 (462???) S1 as a Class 1 laser product. These modules have been tested and approved to comply with International Class 1 laser product certification. Consult the label on each transceiver for laser certification numbers and approval information.
3. Two user-supplied, fiber-optic duplex cables, one for each connector, are needed for a dual-ring attachment. One fiber-optic duplex cable is required for a single-ring attachment.
4. The FDDI fiber-optic cables are attached directly to the transmitter and receiver of the FDDI OSA-2 to maximize the optical power budget that is available.
5. Use strain relief (P/N 07H6805) to secure the cable at the tailgate of the machine.
6. The recommended cross-section for the FDDI fiber-optic cable is 62.5/125 micron fiber.
7. On a FDDI OSA-2, a low-cost fiber channel standard (FCS) connector is used, rather than the standard Media Interface Connector (MIC) that is used on a FDDI OSA-1. The FCS connector, which is also called a duplex-SC connector, is defined in *ANSI Fiber Channel Physical and Signalling Interface (FC-PH)*.
8. LP-to-LP communications can be established if supported by the configuration of the system. Because these are site-dependent factors, LP-to-LP communications are not formally supported.
9. When you attach a FDDI OSA-2 to a FDDI LAN, check to see whether you will need to replace an existing network cable, which could typically be a MIC-to-MIC or MIC-to-ST (straight tipped) cable. Two scenarios that require an FCS-to-MIC jumper cable are described in the paragraphs that follow this list.
10. Remember to maintain transmit and receive orientation when introducing the new duplex jumper cable or coupler.

***If a FDDI OSA-2 FCS connector is close enough to a MIC distribution (patch) panel***, an FCS-to-MIC jumper cable of the same length can be used to replace a MIC-to-MIC jumper cable. Such a replacement is shown in the following figure. A 2 m (6.6 ft) IBM-supplied jumper cable (PN 47H0259) is available as one part of adapter kit PN 47H0260.

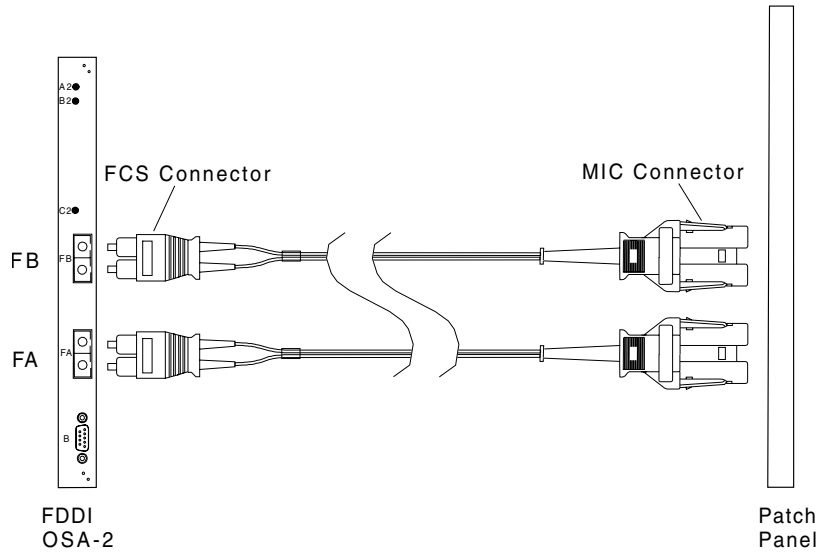


Figure 6. FCS-to-MIC Jumper Cable Can Replace MIC-to-MIC Jumper Cable

The same adapter kit (PN 47H0260) contains a MIC-to-MIC coupler (PN 92F9008), which allows you to attach the FDDI OSA-2 FCS connector to a MIC connector via the FCS-to-MIC jumper cable (PN 47H0259).

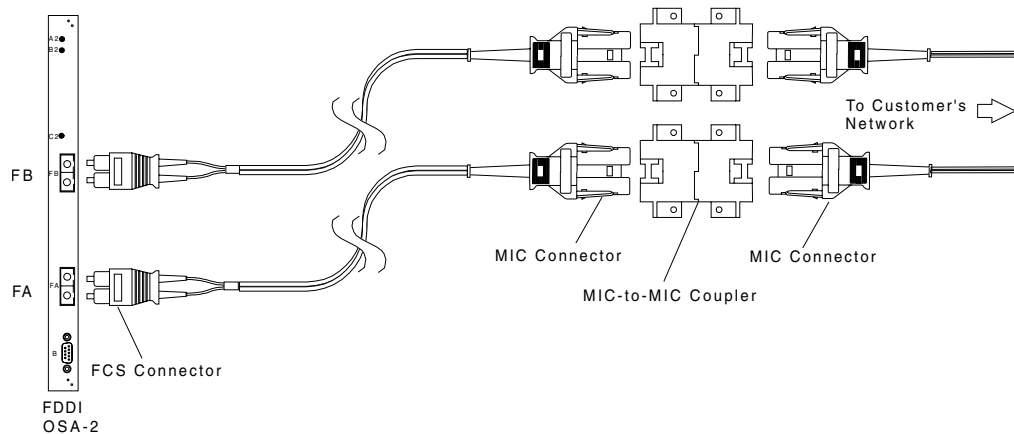


Figure 7. Use MIC-to-MIC Coupler to Attach FCS Connector to MIC Connector

**To attach a FDDI OSA-2 FCS connector to an ST patch panel,** you could insert a SC duplex-to-ST adapter in the patch panel, such as PN 54G3381, and use an FCS-to-FCS cable of the appropriate length. 6.25 micron multimode jumper FCS-to-FCS cables with riser rated as low halogen are available as PNs 08H2777 through 08H2783 in the following lengths: 8m, 13m, 22m, 31m, 46m, 61m, and custom length. For example, PN 08H2780 is the 31m jumper cable.

## Optical Bypass Switch

A customer-supplied, external, optional, optical bypass switch provides optical isolation from the attached FDDI LAN when such isolation is needed.

- If you order an optical bypass switch, take into account the requirements for the fiber-optic cables, which are listed in the preceding section, and the requirements imposed by the connector for the power lead, which is described in the next section.



- When cabling the switch to the FDDI connector, plan to make the switch operational before the OSA channel. Otherwise, you must configure the OSA channel and all its devices offline from all the partitions to which it is defined; make the switch operational, and then configure the OSA back online, or do a power on reset (POR).

### **FDDI OSA-2 Connector for the Power Lead**

The bottom connector on a FDDI OSA-2 allows the attachment of the power lead of the customer-supplied optional, optical bypass switch. This connector is a 9-pin subminiature “D” shell receptacle that uses 4–40 screw locks and has the following pin assignments:

**D01** +5V to the secondary switch

**D02** +5V to the primary switch

**D03–D05**

Ground

**D06** Sense switch presence

**D07–D09**

No connection

### **Customer-Supplied Power Lead**

A power lead is typically part of the optical bypass switch. For the customer-supplied power lead:

- There must be a one-to-one (1:1) wiring, that is, pin 1 on the plug end is wired to pin 1 on the receptacle end.
- The length should not exceed 12.2 meters (12.2 m), or 40 feet (40 ft.) to assure proper voltage at the optical bypass switch.
- An extension cable can be used if the power lead is not long enough. The extension cable should be a 9-pin “D” shell plug-to-receptacle extension cable.
- An adapter cable can be made to match the power lead connector on a given switch to the FDDI OSA-2 connector for the power lead.

## **FDDI Frame Protocol and Maximum Users**

*In the TCP/IP Passthru and HPDT MPC modes*, the maximum number of users depends on the maximum number that is supported by the host TCP/IP endpoint. The following FDDI frame protocol is supported:

FDDI ANSI X3T9.5 using the 802.2 SNAP envelope

*In the SNA mode*, the highest number of PUs supported is 2047, which requires the PTF resolution of the appropriate APAR. See page 31 (OS/390), page 47 (VM/ESA), or page 63 (VSE/ESA). If 2047 PUs are not supported, the maximum number is 255 PUs.

The following frame protocol is supported:

IEEE 802.2 LAN MAC (ANSI X3T9.5 using the 802/2 envelope)



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## Chapter 3. OSA in a z/OS or OS/390 Environment

An OSA can be defined to a z/OS or OS/390 system image if the system is running in LPAR mode or to a system that is running in basic mode. The OSA CHPID and its associated devices can be defined to be shared across logical partitions.

---

### Task Planning Checklists

#### General OSA Planning

- \_\_\_ 1. Determine which OSA mode or modes will be used for each OSA-2. This decision underlies many of your planning activities. The OSA-2 token ring feature runs in TCP/IP Passthru and SNA modes. The OSA-2 FDDI feature runs in TCP/IP Passthru, SNA, and HPDT MPC (IP) modes.
- \_\_\_ 2. Ensure the system pre- and co-requisites are met that are listed on page 30 for the hardware requirements, page 31 for the programming requirements in a z/OS or OS/390 environment.
- \_\_\_ 3. For each OSA, define its channel path and its associated control unit in the system hardware I/O configuration. Refer to the discussion that starts on page 18 and to the hardware I/O configuration books listed in the bibliography (page ix).
- \_\_\_ 4. Define the OSA devices, port number, and other characteristics as needed for the routing protocols that you are using. Refer to page 34.
- \_\_\_ 5. Review the OSA port parameters that are listed in Chapter 9 to determine whether you want to change, or alter, any of their settable parameters. Especially consider defining a local MAC address (page 128) for an OSA port.

#### Planning for an OSA Without OSA/SF

Both the token ring and FDDI OSA-2 features can be run without the services of OSA/SF but then only in the TCP/IP Passthru mode and then with the following limitations and conditions.

- \_\_\_ 1. Only the data paths specified in the IBM-supplied default OSA address table (OAT), which is described on page 5, can be used.
- \_\_\_ 2. In the system hardware I/O configuration, you must define a pair of device numbers for the TCP/IP Passthru mode (page 80) for each logical partition to which you want a data path to be defined in this mode. Associate the IBM-supplied default unit address with each device number (page 21).
- \_\_\_ 3. Only those port parameters can be set which can be altered through the OSA frames presented at the standalone support element or single object operations via the hardware management console. For more information, refer to *SE Operations Guide* for the processor.

#### Planning for an OSA With OSA/SF

- \_\_\_ 1. Ensure the OSA/SF requisites are met that are listed in this chapter and in the OSA/SF program directory.
- \_\_\_ 2. Define a device number with unit address X'FE' in the system hardware I/O configuration for each OSA in the partition in which its managing OSA/SF will be running. This is called the OSAD device, the OSA/SF device, or the FE device. For more information, see page 21.

If the system is running in LPAR mode and if more than one instance of OSA/SF will be active concurrently, ensure that these devices are defined to be shared among the logical partitions to which the OSA is defined (page 18).

- \_\_\_ 3. Determine the span of control of each instance, or copy, of OSA/SF (page 34) being used to manage the OSA's mode or modes of operation. Also, decide which OSA/SF interface will be used (page 34).
- \_\_\_ 4. Plan for OSA/SF installation via SMP/E and its operations, which are introduced on page 35. For more information, refer to the OSA/SF program directory and the applicable OSA/SF User's Guide whose title is listed in the bibliography (page vii).
- \_\_\_ 5. If RACF is to be used to control user access to OSA/SF commands and data sets, refer to page 42 and the RACF books listed in the bibliography for help in planning your RACF profiles.

**Note:** RACF is not required by OSA/SF, but if RACF is installed, it must be active when OSA/SF is active.

### **Planning for the OSA/SF OS/2 Interface (GUI)**

- \_\_\_ 1. Establish a communications protocol between the workstation and host systems that you will use (page 38).
- \_\_\_ 2. Download OSA/SF OS/2 interface (GUI) files using Software Installer/2 (SI/2) and install them on the OS/2 platform as described in the appropriate OSA/SF user's guide listed in the bibliography (page vii).

### **Planning for the OSA/SF Microsoft Windows Interface (GUI)**

- \_\_\_ 1. Establish a communications protocol between the workstation and the host systems that you will use (page 38).
- \_\_\_ 2. Download the self-extracting file, IOAWINST.EXE, onto the workstation.
- \_\_\_ 3. Start IOAWINST.EXE, either by double-clicking the IOAWINST object in Windows Explorer, or by entering IOAWINST at a command prompt.

### **Planning for the OSA/SF REXX Interface**

Because the OSA/SF REXX interface uses the TSO/E command line, it requires no special planning. This interface can be used to customize any OSA-2 defined in the system. Additionally, it provides a list of those OSA CHPIDs and allows you to define a managing OSA/SF for each one.

---

## **Requirements**

### **Hardware Requirements**

- An OSA attached to the appropriate network is required. The user-supplied cabling requirements are discussed for each OSA-2 in Chapter 2.
- If one of the OSA or OSA/SF APARs are applied that are listed under the programming requirements, make sure the minimum level of code that is stated in the PTF cover letter is installed for that APAR (page 15).
- A FDDI OSA-2 is required to transfer IP data packets in the HPDT MPC mode.

If OSA/SF for z/OS and for OS/390 is to be used, the following hardware is required.

- To install OSA/SF on the host, one of the following:
  - A 9-track 6250 bpi magnetic tape drive
  - An 18-track 34K 3480 tape cartridge drive

- To establish communications in order to install OSA/SF GUI, one of the following communication adapters that are supported by the operating system (OS/2 or Windows) and the microprocessor:
  - EHLLAPI for 3270 communications protocol
  - TCP/IP communications protocol
  - APPC, or CPI-C, protocol for a node that supports LU 6.2
- To install and use an OSA/SF GUI, the following is *recommended*:
  - A PC with a Pentium 200Mhz (or equivalent) processor, 32 MB RAM, and an SVGA display with a minimum resolution of 1024x768x16 colors.

You may be satisfied with OSA/SF GUI performance on the minimum processor required by your OS/2 or Windows operating system, but the GUI may not display correctly at a lesser resolution.

## Programming Requirements

Only the *minimum program release levels* are listed. Service levels and higher release levels are assumed to be supported. With few exceptions, APARs and the PTFs required for their resolution are too transient to be maintained in this book. For that information, refer to the applicable program directory and to the relevant preventive service planning (PSP) buckets, such as 9672DEVICE, OSA110, and OSA120. Check IBMLink (Service level) and use the Upgrade and Subset values.

### Requirements

#### z/OS and OS/390 Requirements

**General:** OSA-2 features are supported on the z900 running z/OS or OS/390 Version 2 Release 6 through Version 2 Release 10.

In order for OSA/SF for z/OS and OS/390 to provide management to an OSA defined to VM, the following are required.

- VM/ESA 2.2. or later if z/OS or OS/390 is running in one partition with VM running in another partition.
- VM/ESA 2.2 or later if the z/OS or OS/390 system is running as a guest in a VM environment.
- OSA/SF is required for all OSA modes except the TCP/IP Passthru mode.
 

Without OSA/SF support, however, access to an OSA's port in the TCP/IP Passthru mode cannot be shared among the logical partitions (LPs) to which the OSA is defined. Nor can any of the Passthru OAT entries specify a default data path to be used for inbound IP packets with addresses unknown to the OSA.
- In addition to the following requirements, consider the optional system management services that are listed on page 33.

#### **For Both Token Ring and FDDI OSA-2 Features:**

- A maximum number of 2047 PUs per port is supported with the application of the PTF resolution to VTAM APAR OW14043 and to OSA/SF APAR OW23429. Otherwise, only a maximum number of 255 PUs is supported for each port.
- The expanded set of SNA mode port parameters is supported in the SNA mode with the PTF resolution to OSA/SF APAR OW30222. The basic set is supported if the PTF resolution to OSA/SF APAR OW20205 is applied.

***For the TCP/IP Passthru Mode:***

- To support multiple host Home IP addresses in the same inbound Passthru OAT entry or to designate both primary or secondary inbound default paths for IP packets with destination IP addresses unknown to the OSA, the PTF resolution to OSA/SF APAR OW33393 is required.

***For the SNA Mode:***

The following is required.

- Communications Server (CS for z/OS or CS for OS/390). Refer to the bibliography (page ix).

Additionally:

- NetView is optionally supported:
  - NetView 1.3 (5685-152) is required for the Box Manager node for the NetView CSCF. This is the only level of NetView support that is available on a token ring or FDDI OSA-2.

***For the HPDT MPC Mode:***

- OSA/SF with the PTF resolution to OSA/SF APAR OW28254 is required plus one of the following:
  - Communications Server (CS for z/OS or CS for OS/390), whose requirements are listed in the CS books that are listed in the bibliography (page ix).
  - VTAM 4.4 with the PTFs required for HPDT UDP support that are listed in the PTF for TCP/IP APAR PQ03737 plus the PTF resolution to TCP/IP APAR PQ03737. Also, the TCP/IP socket application using UDP must be able to access the network through the OSA-2.
- For OSA/SF to present multiple Home IP addresses used in the transfer of IP data packet, the PTF resolution to OSA/SF APAR OW33393 is required.

***For OSA/SF GUI (OS/2):*** Either OS/2 or OS/2-J is required.

If you use OS/2, OS/2 2.1 is required plus one of the following communications protocols:

- EHLLAPI (3270), which requires the 3270-PC File Transfer Program FTP (program number 5665-311) running at the host and one of the following at the workstation: Personal Communications/3270 4.1 with the PTF resolution to APAR IC14272 or Communications Manager/2 1.1.
- TCP/IP, which requires TCP/IP 2.0 for OS/2 on the workstation.
- APPC (CPI-C), which requires one of the following at the workstation: Personal Communications/3270 4.1 with the PTF resolution to APAR IC14272 or Communications Manager/2 1.1.

If you use OS/2-J, OS/2-J 3.0 (WARP) is required plus the PTF resolution to OSA/SF APAR OW22537 and one of the following communications protocols:

- EHLLAPI (3270), which requires Communications Manager/2-J 1.11 on the workstation being used and the MVS/TSO File Transfer Program V2, or APVUFILE (5799-PGY), running in the host.
- TCP/IP, which requires TCP/IP 2.0 for OS/2 on the workstation.
- APPC (CPI-C), which requires Communications Manager/2-J 1.11 at the workstation being used.

***For OSA/SF GUI (Windows)::***

- Microsoft Windows 95 4.00.950B (OSR2) or later, or Microsoft Windows NT 4.0 with Service Pack 3 or later.
- To establish GUI to server communications, **one** of the following is required:
  - EHLLAPI (3270), which requires the 3270-PC File Transfer Program FTP (program number 5665-311) running at the host and one of the following at the workstation: Personal Communications/3270 4.1 with the PTF resolution to APAR IC14272 or Communications Manager/2 1.1.
  - TCP/IP, which requires TCP/IP 2.3 on the workstation.
  - APPC (CPI-C), which requires one of the following at the workstation: Personal Communications/3270 4.1 with the PTF resolution to APAR IC14272 or Communications Manager/2 1.1.

The PTF resolution to OSA/SF APAR OW28283 provides a function that was previously available only with the OSA/SF GUI, in which OSA/SF automatically enters the group size as an OAT entry parameter. (Without this PTF, you must input group size = 2 for all OSA modes except the SNA mode, which requires group size = 1.) For more information, see the OSA/SF user's guide listed in the bibliography (page vii).

### Other Management Services

In addition to the requirements for z/OS or OS/390, the following system management programs can benefit OSA operations.

- To meet the security access facility (SAF) of the z900 system on which OSA/SF is running, you can use one of the following:
  - RACF on OS/390 R6 and later.
- NetView whose requirements are listed under the SNA mode requirements for OS/390 (page 32).
- To view status or reconfigure an OSA channel path or device using ESCON Manager, ESCON Manager 1.3 (5688-008) with PTF UN75973 can be used.
- To obtain resource utilization data about OSA channels, you can use:
  - RMF feature of OS/390 R6 or later.

---

## System Hardware I/O Configuration Definitions

Define an OSA channel with its associated logical control unit and logical devices in the system hardware I/O configuration as you would any other channel.

### Notes:

1. Define an OSA channel path as type=OSA (page 18). Make sure you have the correct OSA CHPID. Associate one logical control unit (page 20) with each OSA CHPID.
2. If OSA/SF is to be used, define the OSAD device with its unit address of X'FE' (page 21).
3. Associate the device numbers and unit addresses according to the rules for each OSA mode in which the OSA will be run.
  - See page 20 for the general rules.
  - See page 80 for the device pairs required in the TCP/IP Passthru mode. Both OSA-2 features can be run in the TCP/IP Passthru mode. Although the services of OSA/SF are recommended, they are not required in this mode. An OSA can be run in the TCP/IP Passthru mode concurrently with the SNA mode, HPDT MPC mode, or both modes. The TCP/IP Passthru mode is described in Chapter 6.
  - See page 103 for the SNA mode.



All OSAs can be run in the SNA mode, and they all require the services of OSA/SF in this mode. An OSA can be run in the SNA mode concurrently with the TCP/IP mode, the HPDT MPC mode, or both modes. The SNA mode is described in Chapter 7.

- See page 93 for the HPDT MPC mode.

A FDDI OSA-2 can be run in the HPDT/MPC mode to transfer data packets using the IP protocol. The token ring OSA-2 cannot be run in the HPDT MPC mode. The HPDT MPC mode for IP protocol is described in Chapter 6.

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## z900 Programming Definitions

In a z/OS or OS/390 environment, OSA-2 supports the host programs that transfer data using the IP and SNA protocols as discussed in subsequent chapters on each of these protocols. For more information, refer to the books that are listed in the bibliography (page ix).

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## Deciding OSA/SF Management Span

Only one instance, or copy, of OSA/SF can run on a z/OS or OS/390 system image. However, that instance of OSA/SF can be used to customize, or configure, the modes of operation on all the OSAs defined in the system hardware I/O configuration data set (IOCDs) that the copy of OSA/SF can view.

For a managing instance of OSA/SF to recognize an OSA, you must associate one device number with the OSA channel path that is defined in the same logical partition (or system in basic mode) as the system image on which OSA/SF is running. Furthermore, this device number must be specified as device type = OSAD with unit address = X'FE'. Because of these requirements, this device number is usually called either the OSAD device or FE device.

***An OSA/SF interface partly determines the OSA/SF's span of control.*** Using the OSA/SF GUI interface (OS/2 or Windows), you can establish an active host session with as many sessions with OSA/SF running on a z900 system image as the GUI interface recognizes. Potentially, therefore, this interface allows OSA/SF's span of control to cross CPC boundaries as shown in the following figure. The other OSA/SF interfaces allow the instance of OSA/SF that is running on that system image to manage only those OSAs that it can recognize in its system hardware I/O configuration, that is, in the I/O configuration data set (IOCDs) or I/O definition file (IODF).

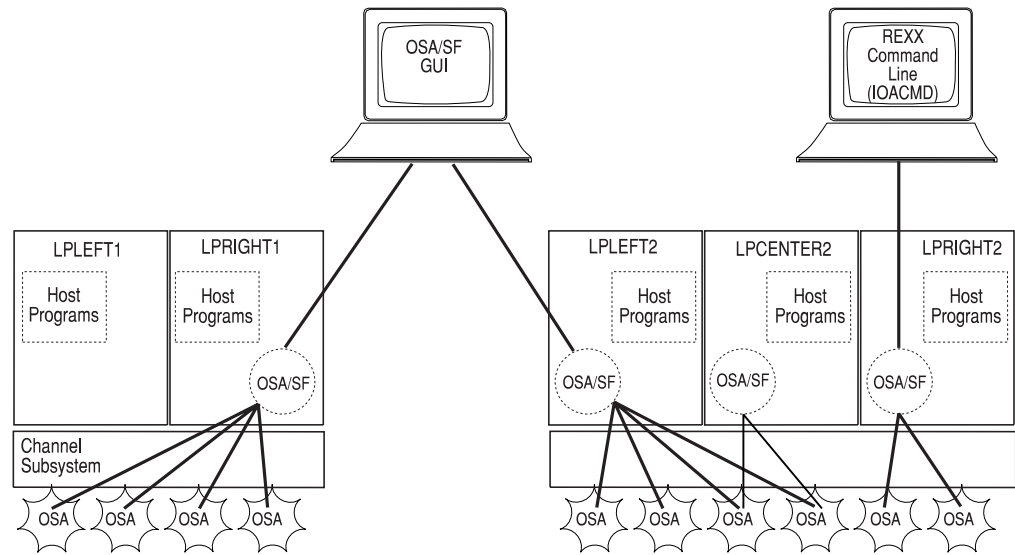


Figure 8. OSA/SF GUI Provides Wider Range of Control than IOACMD

**The system environment partially determines the OSA/SF's span of control.** In the z/OS and OS/390 environments, OSA/SF supports all OSAs and all OSA modes. Each partition uses a copy or *instance* of OSA/SF, and generally, the instance of OSA/SF running on the same partition where the OSAs are defined is the OSA/SF that manages them. It is, however, possible for OSA/SF for VM or OSA/SF for VSE/ESA to customize these OSAs under the limited conditions described on page 49.

**Here are some guidelines for OSA/SF's management.**

- Suppose an OSA is online and operational before OSA/SF is running. That OSA will be managed by the first instance of OSA/SF that is started and that can recognize the OSA.
- Now, suppose one or more OSA/SFs are running, but a particular OSA is not online. That OSA will be managed by the first OSA/SF that can recognize the OSA CHPID and that receives an OSA/SF command to start managing the OSA.
- Conversely, if a managing OSA/SF is terminated, another instance of OSA/SF does not automatically start managing the OSA.

For example:

- If another instance of OSA/SF is already active, it waits until it is instructed to start managing an unmanaged OSA by a user ID through the OSA/SF Start Managing command. The OSA channel, however, continues to transfer data in the OSA mode that is active at the time.
- If another instance of OSA/SF is started, it automatically starts managing all the unmanaged OSAs that have been assigned to its logical partition.

## Planning for OSA/SF

In addition to the general information provided in the following sections, refer to the appropriate OSA/SF program directories, informational APARs, and preventive service planning (PSP) buckets. Also, refer to *OSA/SF User's Guide* which contains instructions on downloading the OSA/SF GUI interface (OS/2 or Windows) as well as instructions on how to use OSA/SF.

## Installing OSA/SF

OSA/SF is installed using the standard SMP/E services. After the OSA/SF data sets have been received, the APPLY SMP/E command is used to install and copy them into the target libraries. Refer to the OSA/SF program directory for more information on installing OSA/SF in these environments. OSA/SF can be accessed through TSO/E or via its API.

- In a z/OS and OS/390 environment, OSA/SF is automatically delivered as a base, non-exclusive OS/390 element. Therefore, OSA/SF is delivered together with many of its corequisites (page 31).

## Starting OSA/SF

In a z/OS or OS/390 environment, OSA/SF runs as a started task. After OSA/SF is installed, but before it can be started, it must be set up as an APPC server. For procedures, see the relevant OSA/SF program directory and OSA/SF User's Guide. The basic steps are to:

- Edit the APPCPMxx member in SYS1.PARMLIB, or the system library being used.
- Decide whether you can and want to change the IBM-supplied name of 'IOASERV'. You can change this name if:
  - You are using OSA/SF Release 2 and the PTF resolution to APAR OW19400 has been applied.
  - You have added the following additional line in the OSA/SF STARTUP Profile:  
SET APPC NAME *luname* where you replace *luname* with the name you want to use.
- Now, add the following statements. IOASERV is used in this example.  
LUADD ACBNAME(IOASERV)  
NOSCHED  
TPDATA(SYS1.APPCTP)
- Then, stop and start APPC to include the statements. If OSA/SF GUI is to be used, the OSA/SF data sets must be downloaded to the workstation in the appropriate file format (OS/2 or Windows). For procedures, refer to the appropriate OSA/SF user's guide (page vii).

## OSA/SF Interface to Use

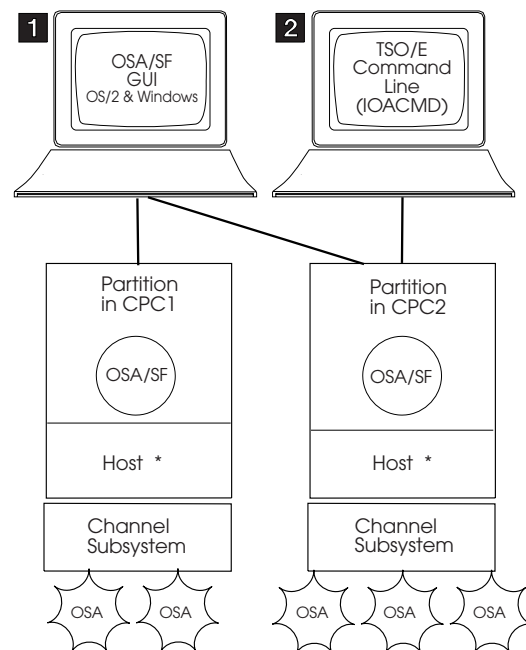


Figure 9. The Two OSA/SF User Interfaces

Figure 9 shows the two OSA/SF user interfaces that are available in a z/OS or OS/390 environment. If either of these system images is running as a guest in a VM environment, see page 49 for the role of OSA/SF.

**Note:** For more information on OSA/SF, see the appropriate OSA/SF User's Guide, all of which are listed in the bibliography on page vii.

### 1 OSA/SF GUI interface (OS/2 or Windows)

- Can be used for all OSA/SF functions, offering the advantages of an application running on an OS/2 or Windows platform at a programmable workstation, including interactive function panels with pull-down menus and online help panels.
- Consists of files that are downloaded to an OS/2 or Windows platform from the host operating system on which OSA/SF is running.
- Allows you to use templates for many of the OSA/SF functions. The templates are stored in the OSA/SF SIOASAMP library.
- Can establish a session with any OSA/SF running on any host operating system with which the workstation can establish an active host session.
- Requires one of the following communications protocols to be established with the host system on which OSA/SF is running: EHLLAPI (page 38); TCP/IP (page 39); or APPC (page 41).

### 2 REXX Execs at the TSO/E command line

- Can be used to customize any OSA-2 defined in the system in any OSA mode. Upon request, a list of the OSA CHPIDs and their types is provided. If OSA/SF is not currently managing a CHPID that is online, this interface can be commanded to do so.

- Must be used to customize an OSA in the SNA mode if the OSA is to be used as the communications controller between the host and OSA/SF OS/2 interface (GUI).
- Can control only those OSAs defined to the host system image on which the TSO/E user ID is also running.

## Handling Problems Using OSA/SF

Handle problems with the system procedures that you would generally use for an application in a z/OS or OS/390 environment. Note that OSA/SF can display OSA-related data items, such as messages and dumps, that are not related to OSA/SF operations.

- If a problem appears to have occurred, make sure the managing OSA/SF is identified.

As stated on page 34, one instance of OSA/SF can manage a number of OSAs. Also, an OSA can be managed, in turn, by different instances of OSA/SF.

When investigating the symptoms of problems with an OSA, make sure the managing OSA/SF is identified. If OSA/SF GUI is being used, this can be done by clicking on the OSA/SF host icon and having the statistics notebook page displayed. If the TSO/E command line or the OSA/SF API is being used, the Query command provides the same information.

- Check for OSA/SF messages, which are in the format of IOAxxyyz, where x denotes the OSA/SF component, yyy is the sequence number, and z signifies the severity of the condition.

These messages are stored in the OSA/SF message log together with the OSA/SF commands and responses that have been issued. You can get the IOA messages with the OSA/SF Get Debug command.

- Tracing is a default operation for OSA/SF. You can, therefore, get the trace log by using the Get Debug command and specifying Trace log.
- Because each instance of OSA/SF runs as an application, its contents can be dumped as part of a system dump. When directed by support personnel, a dump of the host program with which an OSA is communicating will need to be taken as part of a system dump. Refer to the system books listed in the bibliography for more information.

---

## Setting Up a Communications Protocol for OSA/SF GUI

You can set up an EHLLAPI, TCP/IP, or APPC communications protocol.

- Checklists and guidelines are provided in the following sections.
- Instructions on how to use an OSA running in the SNA mode as a communications controller are provided in the OSA/SF user's guide.
- For more information on the communications protocols, refer to the applicable books listed in the bibliography.

## Setting up an EHLLAPI Communications Protocol

### At the Host, Take These Steps

1. Ensure that the host session is able to do SENDs and RECEIVEs.

If the host session cannot do this, you will need to set up the VTAM mode table entry for your terminal so that the device supports extended data stream capability.

2. Ensure that your TSO/E logon procedure points to the code library of OSA/SF, which defaults to SYS1.SIOALMOD and contains IOAXHSRV, and to the appropriate C run-time library.
3. Ensure that you are logged on with a TSO/E user ID and are at TSO READY.
4. Ensure that this user ID has at least five cylinders of DASD space available for temporary allocation of data sets.
5. Start the OSA/SF GUI program on the workstation.
  - For Windows, look for **IBM OSA Support Facility** in the Programs view.
  - For OS/2, look on the OS/2 desktop.
6. Select **Help** from the action bar and then select **How To**.
7. Select **Create Another** server icon for the GUI to server Communications. Follow the instructions and use online Help.

**Notes:**

1. When EHLLAPI is being used, session requests to a host are serialized. That is, one session request must finish before another session request can start.
2. To stop messages so that EHLLAPI communications will not be interrupted, at TSO Ready issue: PROF NOINTERCOM

**At the Workstation, Take These Steps**

For OS/2:

1. Ensure that Personal Communications 4.1 with the PTF resolution to APAR IC14372 with either OS/2 or OS/2-J is set up as described in the requirements (page 31 for OS/390 and z/OS).
2. Ensure that the OSA/SF GUI users know which session should be used for communications to the host.

For Windows:

1. Ensure Personal Communications 4.2 with CSD #2 is set up as described in the requirements ("For OSA/SF GUI (Windows):" on page 32).
2. Ensure that the OSA/SF GUI users know which session should be used for communications to the host.

## Setting up a TCP/IP Communications Protocol

OSA-2 supports the TCP/IP program on any of the z900 platforms that it supports. It also supports the TCP/IP function of CS for OS/390 on an OS/390 platform.

**At the Host, Take These Steps**

Create a TCP/IP configuration file for the TCP/IP address.

1. Copy the IOASRV member in the SIOASAMP library to a member in the SYS1.PROCLIB or any other valid system procedures library. The job will be started by TCP/IP.
2. Depending on the security procedures for your installation, you may need to authorize IOASRV to verify user IDs and their passwords. IOASRV is associated with those user IDs (or group) that logon through the GUI. IOASRV is a TCP/IP socket server.

If you are using RACF as the security management tool, update the local user module that replaces the RACF ICHRIN03 module in the started procedures name table. For more information, refer to the RACF books listed in the bibliography (page ix). You can use the RACF general resource class named STARTED or you can create source for ICHRIN03. Then, assemble and link edit the source into SYS1.LPALIB.

3. Use the TCP/IP socket number in the IOASRV started procedure to define the port number used by the OSA/SF GUI. The socket number is used to connect the GUI to TCP/IP on the host. This TCP/IP socket (port) number must also be specified at the GUI workstation as a parameter when communications are started with TCP/IP.

4. Include the OSA/SF server, IOASRV, in the Autolog statement in the TCP/IP profile.

```
AUTOLOG
      .
      IOASRV      ; OSA/SF Server
      .
ENDAUTOLOG
```

5. Also include the OSA/SF socket number and server name in the Port section:

```
PORT
      .
      2000 TCP IOASRV      ; OSA/SF Server
      .
ENDPORT
```

6. Use a file, for example, *yourprefix*.TCPIP.DATA, to specify the configuration information required by the TCP/IP client programs.

- To specify the TCP host name of this system, use the HOSTNAME statement or let the name default to the node name specified in the IEFSSNxx PARMLIB member.

```
HOSTNAME OSASF
```

- Use the TCPIPJOBNAME statement to specify the member name (JOBNAME) of the procedure used to start the TCP/IP address space. If you do not specify the name and if your TCP/IP started procedure name (JOBNAME) is not the default name of TCPIP, clients will fail at startup with an irrecoverable interaddress communication error.

```
TCPIPJOBNAME TCPIPSF
```

- Specify the DATASETPREFIX statement in *yourprefix*.TCPIP.DATA data set. The parameter in this statement, which can be up to 26 characters and must *not* end with a period, takes precedence over either the distributed or the modified data set prefix name as changed by the EZAPPRFX installation job. If this statement is used in a profile or configuration data set that is allocated to a client or server, that client or server dynamically allocates additionally required data sets using the statement's parameter value as the data set name prefix.

```
DATASETPREFIX TCPIPSF
```

7. If more than one TCP/IP image is running on the host, you must distinguish which TCP/IP image is controlling the IOASRV program. To do this, take the following steps.

- a. Uniquely identify the TCP/IP configuration profile data set with the following PROFILE statement:

```
//PROFILE DD DSN=yourprefix.PROFILE.TCPIP
```

in the TCP/IP startup JCL. During initialization of the TCP/IP address space, system operation and configuration parameters are read from the configuration profile data set. (Refer to "Specify Configuration Statements in PROFILE.TCPIP" in *TCP/IP Customization and Administration Guide*.)

- b. Place the '//SYSTCPD DD' statement in the TSO logon procedure and in the JCL of any client or server executed as a background statement. The SYSTCPD statement identifies the data set to be used to obtain the parameters defined by TCPIP.DATA.

```
//SYSTCPD DD DISP=SHR,DSN=yourprefix.TCPIP.DATA
```



- c. Ensure the IOASRV member you copied from the IOA.SIOSAMP library into SYS1.PROCLIB has the '//SYSTCPD DD' line in it to associate IOASRV to the specific TCP/IP image.

```
//SYSTCPD DD DSN=yourprefix.TCPIP.DATA,DISP=SHR
```

### At the Workstation, Take These Steps

1. Set up TCP/IP to access the host.
2. Verify that communications have been set up by pinging the host IP address used to access IOASRV for OSA/SF as a z/OS or OS/390 element.
3. Start the OSA/SF GUI program on the workstation.
  - For Windows, look for **IBM OSA Support Facility** in the Programs view.
  - For OS/2, look on the OS/2 desktop.

After the program starts, an OSA/SF server window is displayed with a Sample icon.

4. Select **Help** from the action bar and then select **How To**.
5. Select **Create Another** server icon for the GUI to server Communications. Follow the instructions and use online help.

## Setting up an APPC, or CPI-C, Protocol

APPC is the term used in this section because that is the name for the LU 6.2 protocol. OSA/SF GUI, however, interfaces with the CPI-C, which is a commonality layer for workstation applications, and therefore uses that term on its panels.

Setting up APPC places requirements on each target host where the host OSA/SF application is running, the controller being used for the communication, and the workstation on which OSA/SF GUI will be running.

### At the Host, Take These Steps

1. Add an APPC/MVS TP profile for the OSA/SF GUI to the APPC data set (TPADD TPNAME).
2. Add an entry in SYS1.PARMLIB(ASCHPMxx) for the OSA/SF-to-APPC scheduler interface (CLASSADD CLASSNAME).
3. Add an entry in SYS1.PARMLIB(APPCPMxx) for the OSA/SF-to-APPC GUI interface (LUADD ACBNAME). This ACBNAME must match the VTAM APPL-ID (next step) and the CM/2 Symbolic Destination Name (SDN) for GUI communications. Note that an LUADD entry for IOASERV will have already been made as part of the OSA/SF installation; this is a second LUADD entry for the OSA/SF GUI's VTAM access control block (ACB).
4. Add an entry in SYS1.VTAMLST for the GUI-to-VTAM-Application-ID (VBUILD TYPE=APPL). The ACBNAME in the APPL statement must match the ACBNAME in the APPCPMxx entry (previous step) and the CM/2 SDN. (This is also a good point to verify that your installation APPC applications that will establish sessions through the OSA are defined to VTAM.)
5. To use the APPC GUI-to-host interface, add an entry in SYS1.VTAMLST for one of the following communication control unit types if the entry does not already exist :
  - If you are using OSA as an external communications adapter (XCA), proceed with the next step.
  - For all other communications controllers, such as a 3172, 3174, or 37x5, refer to the books on that type of controller for more information.

6. If you use an OSA-to-VTAM connection (VBUILD TYPE=XCA), you can use the same VTAM entry, which was used to define the OSA in the SNA mode, to establish an OSA/SF APPC GUI-to-host (CP-to-CP) session. Either a VTAM host Interchange Node or Network Node is required.

If SNA 3270 emulation support is to be used from the workstation GUI to the host across the OSA, however, it is necessary to add a VTAM TYPE=SWNET entry with a GRPNM matching the OSA XCA node name. Refer to the OSA/SF user's guide for more information.

### At the Workstation, Take These Steps

1. Configure one of the following on the workstation where the OSA/SF GUI interface is to run to support an APPC CP-CP session:
  - Personal Communications (PCOMM) 4.1 with the resolution to APAR IC14272.
  - Communications Manager/2 (CM/2) 1.1.

In the SNA Feature List, CPI Communications Side Information, the Symbolic Destination Name (SDN) must match the ACBNAME in the host OSA/SF GUI VTAM APPL-ID and the host APPC LUADD entry.

If SNA 3270 emulation support is to be used from the workstation, configure PCOMM or CM/2 with additional support for SNA 3270 emulation. Refer to the OSA/SF user's guide for more information.

2. Using the GUI OSA/SF online help panel *Create Another Host Icon* as a guide, build an OSA/SF host icon to support the CPIC protocol. (CPIC is synonymous with APPC in this case.) The SDN in the OSA/SF GUI icon must match the PCOMM or CM/2 SDN, the OSA/SF host APPC LUADD name, and the OSA/SF GUI VTAM TYPE=APPL ACBNAME. The host name in the icon is a user variable.

---

## Controlling Access to OSA/SF (RACF)

OSA/SF uses the System Authorization Facility (SAF) interface to let you optionally control user access to its commands and—in a z/OS or OS/390 environment—to the system data sets that OSA/SF uses. In the following OSA-specific planning information, RACF is assumed to be used. (If RACF is installed, OSA/SF requires that it be active.) For more information on RACF, refer to the manuals listed in the bibliography (page ix).

### ***OSA/SF supports these RACF levels of authority:***

- **None**, which prevents a user ID from entering any OSA/SF command.
- **Read**, which allows a user ID to view the OSA address table and debugging information.
- **Update**, which allows a user ID to enter all OSA/SF commands and enter all the options except the Force and the Stop\_disk\_serving options.
- **Control**, which allows a user ID to enter all OSA/SF commands with all the options.

The OSA/SF commands are listed in the following tables, and are described in detail in the OSA/SF user's guide listed in the bibliography (page vii). The **Configure OSA** command, which is not included in this list, uses many of the commands listed to accomplish its tasks. Although **Configure OSA** does not require RACF authority itself, many of the commands it uses do. Providing authority for all the commands in the table will assist with any problem determination in the future.

***If OSA/SF is managing an OSA in a z/OS or OS/390 environment*** and if you protect data sets, follow the same procedures that you use for other system data sets.

OSA/SF on z/OS and OS/390 runs as a started task. So give OSA/SF access to the data sets which it uses and which are listed in the OSA/SF startup profile. Unless the data set names that are shipped have been renamed, therefore, give access to 'IOA.SYS1.\*', 'IOA.CEC1.\*', and 'IOA.SIOALMOD'.

## OSA/SF Tasks and Commands

| Command                      | Task                                                                                                                                       | RACF Facility      | Level   |
|------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|--------------------|---------|
| Clear Debug                  | Clear the OSA/SF message log.                                                                                                              | IOA.CLEAR.DEBUG    | Control |
| Delete File                  | Delete a file.                                                                                                                             | IOA.DELETE.FILE    | Control |
| Get Config                   | Get the configuration data on an OSA-Express. This command does not apply to OSA-2.                                                        | IOA.GET.CONFIG     | Read    |
| Get Debug                    | Gets the OSA/SF message log, OSA/SF trace table, and other OSA/SF debug data.                                                              | IOA.GET.DEBUG      | Read    |
| Get File                     | Get a file.                                                                                                                                | IOA.GET.FILE       | Control |
| Get Table                    | Get the entries of an OSA Address Table (OAT). This command can be issued only through IOACMD at the TSO/E command line.                   | IOA.GET.TABLE      | Read    |
| Install                      | Create and install (or activate) an OSA mode configuration.                                                                                | IOA.INSTALL        | Control |
| Put File                     | Put a file.                                                                                                                                | IOA.PUT.FILE       | Control |
| Put Table with Force         | Update and store an OAT disregarding whether an entry is in use. This command can be issued only through IOACMD at the TSO/E command line. | IOA.PUT.TABLE      | Control |
| Put Table without Force      | Update and store an OAT only if an entry is not in use. This command can be issued only through IOACMD at the TSO/E command line.          | IOA.PUT.TABLE      | Update  |
| Query                        | Get data about an OSA, OSA/SF, and/or active OSA modes on an OSA.                                                                          | IOA.QUERY          | Read    |
| Set Parameters               | Set the OSA LAN port parameters that are settable with OSA/SF.                                                                             | IOA.SET.PARAMETERS | Control |
| Start Managing with Force    | Start managing an OSA by this instance of OSA/SF even if that forces another instance of OSA/SF to stop management.                        | IOA.START.MANAGING | Control |
| Start Managing without Force | Start managing the specified OSA by this instance of OSA/SF without forcing another instance of OSA/SF to stop managing the same OSA.      | IOA.START.MANAGING | Update  |
| Stop Managing                | Stop managing the specified OSA by OSA/SF.                                                                                                 | IOA.STOP.MANAGING  | Update  |

| Command     | Task                                                                                                                                                            | RACF Facility | Level  |
|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|--------|
| Synchronize | Synchronize (set) the OAT entries and settable port parameters known by the managing OSA/SF with those on the specified OSA. (Match OSA/SF to the OSA feature.) | IOA.SYNC      | Update |

## Some Examples of RACF Profile Definitions

When defining a RACF profile generically or for an individual OSA/SF command, use the RACF RDEF command with a class of FACILITY. Enter the fully qualified facility name, starting with the characters IOA and using periods as separators, as shown in the following examples. For more information on the RACF commands, see the RACF commands books listed in the bibliography (page ix).

- To define a profile for an individual OSA/SF command, for example, the Get Table command to read an OAT, enter: **RDEF FACILITY IOA.GET.TABLE**
- To define a profile to allow user IDs to enter this command, enter:  
**RDEF FACILITY IOA.GET.TABLE UACC(READ)**
- To allow the use of generics for a class of service facility, enter: **SETROPTS GENERIC FACILITY**
- To prevent unauthorized use of OSA/SF commands, enter: **RDEF FACILITY IOA.\* UACC(NONE)**. If you have already prohibited all user IDs from using OSA/SF commands, you must explicitly assign RACF authorization to allow designated user IDs to enter an OSA/SF command.

## Some Examples of RACF Authorization Assignments

Enter the RACF PERMIT command and its parameters. The profile parameter, for example, IOA.GET.TABLE or \*, determines the authorization level of the user ID identified in the ID parameter. (The Access parameter identifies the authorization given. You can use an asterisk to designate a generic class on the PERMIT parameters.)

- To allow all users to send all commands that require the Read authority, enter:  
**PERMIT IOA.\* ACCESS(READ) CLASS(FACILITY) ID(\*)**
- To assign authorization by Access level, for example, to authorize user ID RPAUL to access the Control level, enter: **PERMIT IOA.\* ACCESS(CONTROL) CLASS(FACILITY) ID(RPAUL)**
- To authorize another user (GLASER) to enter all commands that require the update authorization, enter: **PERMIT IOA.\* ACCESS(UPDATE) CLASS(FACILITY) ID(GLASER)**
- To assign authorization by specific OSA/SF commands, for example, to authorize all user IDs to enter the Get Table command, enter: **PERMIT IOA.GET.TABLE ACCESS(READ) CLASS(FACILITY) ID(\*)**
- To authorize ID PINGCHAN to enter any command requiring the Update control option, enter: **PERMIT IOA.\* ACCESS(UPDATE) CLASS(FACILITY) ID(PINGCHAN)**
- To authorize a specific profile name, for example, to authorize user ID JGOLDMAN to enter the Put Table command with or without the Force option, enter:  
**PERMIT IOA.PUT.TABLE ACCESS(CONTROL) CLASS(FACILITY) ID(JGOLDMAN)**

---

## Chapter 4. OSA in a z/VM or VM/ESA Environment

In a VM environment, an OSA-2 token ring or FDDI feature can be run in the TCP/IP Passthru and SNA modes with VM/ESA 2.2. or later. HPDT MPC mode is not supported.

---

### Task Planning Checklist

- \_\_\_ 1. For each OSA, determine whether it will be run in the TCP/IP Passthru mode only, the SNA mode only, or in both the TCP/IP Passthru and SNA modes concurrently. This decision underlies many of your planning activities.
- \_\_\_ 2. Ensure the pre- and co-requisites are met that are listed in the next section (page 46).
- \_\_\_ 3. For each OSA, define its channel path and its associated control unit in the system hardware I/O configuration. See page 17, page 48, and the hardware I/O configuration books listed in the bibliography (page ix).
- \_\_\_ 4. Check whether OSA/SF is needed and available. OSA/SF is required for all OSA modes except the TCP/IP Passthru mode in limited conditions.
- \_\_\_ 5. Ensure the OSA/SF requisites are met that are listed in the next section (page 46) and in the applicable OSA/SF program directory.
- \_\_\_ 6. For each OSA, define a device number with unit address = X'FE' in the system hardware I/O configuration in the logical partition in which its customizing OSA/SF will be running (page 21).

If the system is running in LPAR mode and if more than one instance of OSA/SF will be active concurrently, ensure that the OSA device number or numbers will be defined to be shared among logical partitions to which the OSA is defined (page 18).
- \_\_\_ 7. Determine the span of control for each instance, or copy, of OSA/SF (page 49).
- \_\_\_ 8. Decide which OSA/SF user interface or interfaces will be used (page 51).
- \_\_\_ 9. If the OSA/SF GUI interface (OS/2 or Windows) is to be used, establish a communications protocol between the workstation and host system images to be used. See *VM/ESA: Open Systems Adapter Support Facility User's Guide*, that is listed in the bibliography (page vii ). Download the OSA/SF interface (GUI) files and install them on the OS/2 or Windows platform.
- \_\_\_ 10. If RACF is to be used to control user access to OSA/SF commands and data sets, plan the RACF profiles that are described on page 55 and in the RACF books.

Note that RACF is not required, but if it is installed, it must be active when OSA/SF is active.
- \_\_\_ 11. Plan for OSA/SF installation and its operations.
  - If OSA/SF for VM/ESA is to be used, installation is via SES. See page 52, the OSA/SF for VM/ESA program directory, and *VM/ESA: Open Systems Adapter Support Facility User's Guide*.
  - If OSA/SF for z/OS and OS/390 is to be used, see page 35.
- \_\_\_ 12. Plan for the TCP/IP Passthru mode (page 78) or the SNA mode (page 101) or both modes.

---

## Requirements in a VM Environment

### Hardware Requirements

An OSA that is attached to an appropriate network is required. Ensure the OSA is at the code level you need (page 15). If OSA/SF for VM/ESA is to be used, an OSA-2 is required and:

- Each OSA must be represented by a minidisk that contains the OSA's channel file. Allocate 5 cylinders of 3390 DASD, or equivalent, for each minidisk.
- To install the OSA/SF on VM, one of the following is needed: a CD-ROM; a 6250 bpi magnetic tape; a 34K 3480 tape cartridge; a 4mm cartridge.
- To establish a communications protocol between the workstation on which the OSA/SF OS/2 interface (GUI) and the z900 OSA/SF, one of the following communication adapters is required. The adapter must be supported by OS/2 and the microprocessor:
  - EHLLAPI for 3270 communications protocol
  - TCP/IP communications protocol
  - APPC, or CPI-C, protocol for a node that supports LU 6.2
- If OSA/SF for VM/ESA GUI interface (OS/2 or Windows) is to be used:
  - A PC with a Pentium 200 Mhz (or equivalent) processor, 32 MB RAM, and an SVGA display with resolution of 1024x768x16 colors.

You may be satisfied with OSA/SF GUI performance on the minimum processor required by your OS/2 or Windows operating system, but the GUI may not display correctly at a lesser resolution.

### Programming Requirements

Only the *minimum program release levels* are listed. Service levels and higher release levels are assumed to be supported. For information on how to check an OSA code level, see page 15.

With few exceptions, APARs and the PTFs required for their resolution are too transient to be maintained in this book. For that information, refer to the applicable program directory and to the relevant preventive service planning (PSP) buckets. Check IBMLink (Service level) and use the Upgrade and Subset values.

- If OSA/SF for VM/ESA is being used, check the OSASF/220 subset ID in the VMESA210F PSP bucket.
- If OSA/SF for z/OS and OS/390 is used, check the OSA120 and OSA210 PSP buckets.
- If OSA/SF for VSE/ESA is being used, check the OSA/SF/1G7 subset ID in the VSEESA221 PSP upgrade bucket.

#### Starting with VM/ESA 2.2.0

- OSA-2 can be supported by OSA/SF for VM/ESA, which is a VM/ESA 2.2.0 facility.

#### VM as a Host to Guest System Images

If OSA/SF is running on a VM guest system image, you must define the OSA to the host VM system image as follows:

- Specify the same unit address for the guest and host systems for each device number that is required for the mode.
- Specify the same device number for OSA/SF in the guest and in the host. By definition, this must have X'FE' as its unit address.



The CHPID must be the same one that is defined for it in the system hardware I/O configuration (IOCDS) so that you cannot generate an IOCDS from a guest (OS/390, z/OS, VSE/ESA) system image.

**Note:** You must authorize the host VM to put OSA/SF in the VM CP directory by specifying the RMCHINFO option in the OPTION Directory Control statement for the OSASF virtual machine.

### **TCP/IP Passthru Mode**

- Requires TCP/IP for VM 2.3 (5735-FAL).
- Requires the PTF resolution to OSA/SF for VM/ESA APAR OW33394 for an expanded Passthru OAT entry that allows multiple Home IP addresses in the same inbound data path and both primary and secondary default inbound data paths to be specified in the appropriate Passthru OAT entries.

### **SNA Mode**

- ACF/VTAM 4.2 for VM/ESA (5654-010) is required.
- The PTF resolution to OSA/SF for VM/ESA APAR OW30932 is required to support the expanded set of OSA mode port parameters (page 106).
- The PTF resolution to OSA/SF for VM/ESA APAR OW24952 is required to support the OSA mode port parameters (page 106).
- A maximum number of 255 PUs is supported for each physical port unless a maximum number of 2047 PUs is supported. To support a maximum of 2047 PUs, the PTF resolution to VM/ESA APAR 608877 is required plus the PTF resolutions for the various OSA-2s listed in the following items.
- For an token ring or FDDI OSA-2, the PTF resolution to OSA/SF for VM/ESA APAR OW24952 is required to support a maximum number of 2047 PUs.
- To support the expanded set of SNA session availability options (page 106), the PTF resolution to OSA/SF for VM/ESA APAR OW30932 is required.
- NetView V2 R3 (5756-051) is optionally supported. If OSA/SF for VM/ESA is being used:
  - On a token ring or FDDI OSA-2, the Box Manager node is supported for the NetView CSCF. The NetView PPI is not supported.
- If OSA/SF for z/OS and OS/390 is managing the OSA and you want NetView support, see the requirements listed on page 33.

### **OSA/SF for VM/ESA**

- Requires VM/ESA 2.2.0 or later, on which it runs as a facility that is distributed through SES.
- Can support RACF 1.9.2 (5740-XXH) to meet its SAF interface.
- If the OSA/SF OS/2 interface (GUI) is to be used, that interface requires either OS/2 or OS/2-J.

If you use OS/2, OS/2 3.0 WARP plus one of the following communications protocols is required:

- EHLLAPI (3270), which requires ACF/VTAM 4.2 for VM/ESA with the resolution to APAR VM59237 and the 3270 PC File Transfer Program (5664-281) on the host. On the workstation being used, one of the following is required: Personal Communications 4.1 with the PTF resolution to APAR IC14272 or Communications Manager/2 1.11.
- TCP/IP, which requires TCP/IP 2.3 for VM (5735-FAL) on the host and TCP/IP 2.0 for OS/2 on the workstation.



- APPC (CPI-C), which requires ACF/VTAM 4.2 for VM/ESA on the host and one of the following on the workstation: Personal Communications 4.1 with the resolution to APAR IC14272 or Communications Manager/2 1.11.

If you use OS/2-J, OS/2-J 3.0 WARP, the PTF resolution to OSA/SF for VM/ESA APAR OW28838, and one of the following communications protocols is required:

- EHLLAPI (3270), which requires ACF/VTAM 4.2 for VM/ESA with the resolution to APAR VM59237 and the 3270 PC File Transfer Program (5664-281) on the host. On the workstation being used, one of the following is required: Personal Communications 4.1 with the PTF resolution to APAR IC14272 or Communications Manager/2-J 1.11.
- TCP/IP, which requires TCP/IP 2.3 for VM (5735-FAL) on the host and TCP/IP 2.0 for OS/2 on the workstation.
- APPC (CPI-C), which requires ACF/VTAM 4.2 for VM/ESA on the host and one of the following on the workstation: Personal Communications 4.1 with the resolution to APAR IC14272 or Communications Manager/2-J 1.11.
- If you use Windows 95, Windows 98, or Windows NT, one of the following communications protocols is required:
  - EHLLAPI (3270), which requires the 3270-PC File Transfer Program FTP (program number 5665-311) running at the host and one of the following at the workstation: Personal Communications/3270 4.1 with the PTF resolution to APAR IC14272 or Communications Manager/2 1.1.
  - TCP/IP, which requires TCP/IP 2.0 for OS/2 on the workstation.
  - APPC (CPI-C), which requires one of the following at the workstation: Personal Communications/3270 4.1 with the PTF resolution to APAR IC14272 or Communications Manager/2 1.1.

---

## System Hardware I/O Configuration Definitions

To VM, define an OSA channel path with its connected, or attached, control unit plus the devices that are required by the OSA mode or modes in which the OSA is being run.

**If you define an OSA to VM dynamically**, you can use the VM/ESA dynamic I/O configuration commands, but the data is put in the HSA and will not be kept after the system is shut down. To keep data across IPLs, you must also define the OSA in the system hardware I/O configuration using IOCP statements. Shown below are the VM I/O configuration statements for OSA X'20'.

```
CP DEFINE CHPID 20 TYPE OSA SHARED ACC LPLEFT1 LPRIGHT1 INIT LPLEFT1 INIT LPRIGHT1
CP DEFINE CU F00 TYPE OSA CHPID 20
CP DEFINE DEVICE F00-F03 UNIT_A 00 CU F00 PAR LPLEFT1 LPRIGHT1
CP DEFINE DEVICE 1FE UNIT_A FE CU F00 PAR LPLEFT1 LPRIGHT1
```

For more information on the user input required, see the descriptions that start on page 17. For information on the VM statements, refer to the following books, which are listed in the bibliography (page ix).

- *VM/ESA: Planning Dynamic I/O Configuration*
- *VM/ESA: CP Command and Utility Reference*

**If more than one copy of OSA/SF is running in a logical partition**, at least one copy is running on a guest system in a VM host environment (page 50). Therefore:

- Specify the same unit address for the guest and host system for each device number that is required for the TCP/IP or SNA modes.

- Specify the same device number for OSA/SF in the guest and in the host. (By definition, this device number must have X'FE' as its unit address.)
- Specify the RMCHINFO option in the VM OPTION Directory Control statement to authorize the VM host to put OSA/SF in the applicable guest directories.
- Attach, or activate, only one copy of OSA/SF in a logical partition at a time.

---

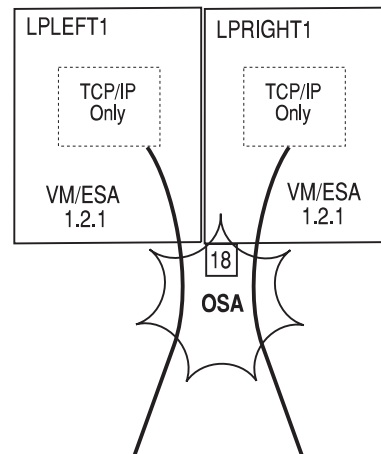
## Evolution of OSA Management Since VM/ESA 1.2.1

An OSA can be defined to VM starting with VM/ESA 1.2.1. OSA/SF for VM/ESA support is available starting with VM/ESA 2.2.0.

### Without OSA/SF Management

An OSA can be defined in a VM/ESA environment without requiring OSA/SF support.

As shown in the adjacent figure, however, such an OSA can only be run in the TCP/IP Passthru mode. Access to its ports cannot be shared by the TCP/IP host programs that have access to the OSA channel path.



### Starting with VM/ESA 2.2.0

OSA/SF for VM/ESA V2R2 is available in addition to the earlier OSA configurations in a VM environment. OSA/SF for VM/ESA is a VM/ESA facility that runs in its own OSA/SF server virtual machine (page 52).

- If the OSA channel path is not defined as shared, only the managing OSA/SF with a read/write path to the OSA's minidisk can receive a Stop Managing command for that OSA.
- If the OSA channel path is defined as shared, the OSA minidisk is secure only if you use CSE XLINK. The OSA/SF that gains control is the first OSA/SF that recognizes the OSA and receives a Start Managing command.
- Before another OSA/SF can gain control, the managing OSA/SF must receive a Stop Managing command. If that is not possible, the OSASF user ID should be logged off. If the system image cannot receive that command, the CSE XLINK Reset command will release the read/write path to the OSA's minidisk.
- OSA/SF for VM/ESA can be accessed through its GUI and by those CMS user IDs that have been set up for the OSA/SF server virtual machine's ID (OSASF).

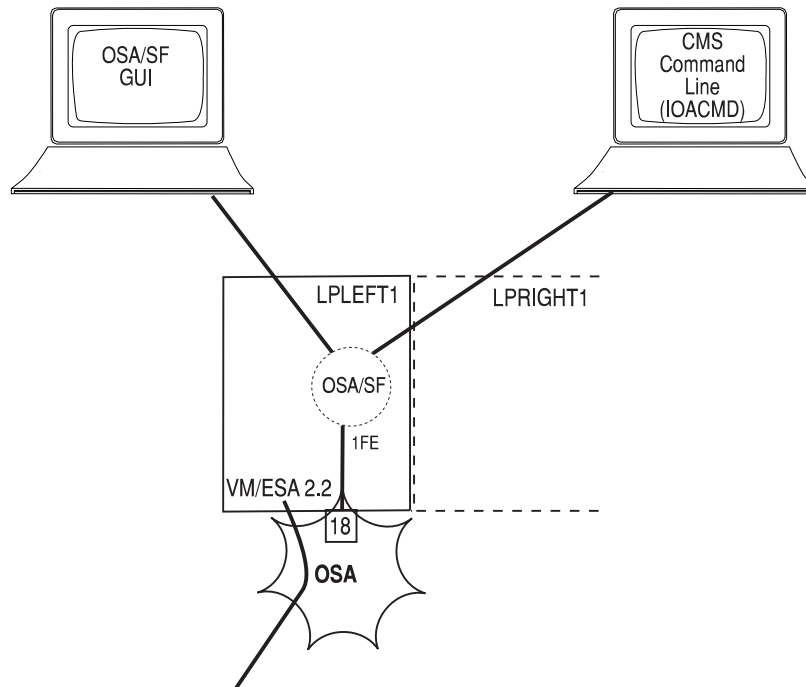


Figure 10. OSA/SF Support for VM Begins with VM/ESA 2.2.0

## OSA/SF Running on a Guest in a VM Environment

OSA/SF can run on OS/390, z/OS, z/VM, VM/ESA, or VSE/ESA when that system image is running as a guest in a VM environment.

The same guidelines apply to each guest. Note especially that:

- You must define the OSA to the VM host system image.
- You must authorize the host to put OSA/SF in the guest's directory by specifying the RMCHINFO option in the OPTION Directory Control statement (page 48).
- For a VSE/ESA guest, you must vary OSA devices and reconfigure OSA CHPIDs through the VM commands (page 73).
- For the requirements, see page 46.

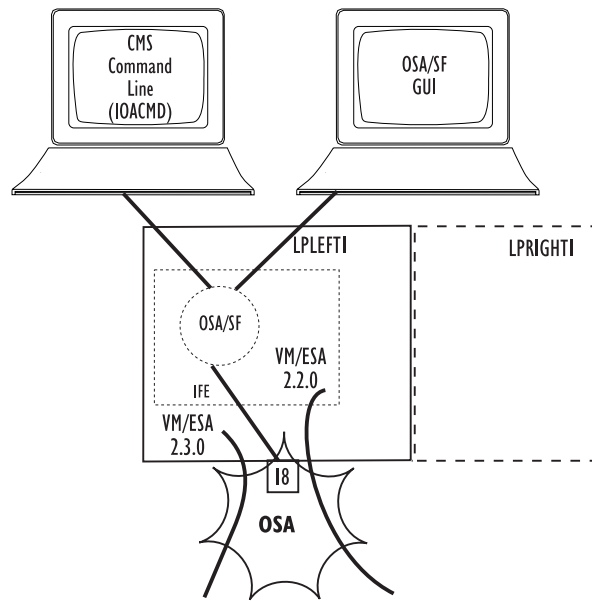


Figure 11. OSA/SF Can Run on a Guest System in a VM Environment

## Deciding Which OSA/SF Interface to Use

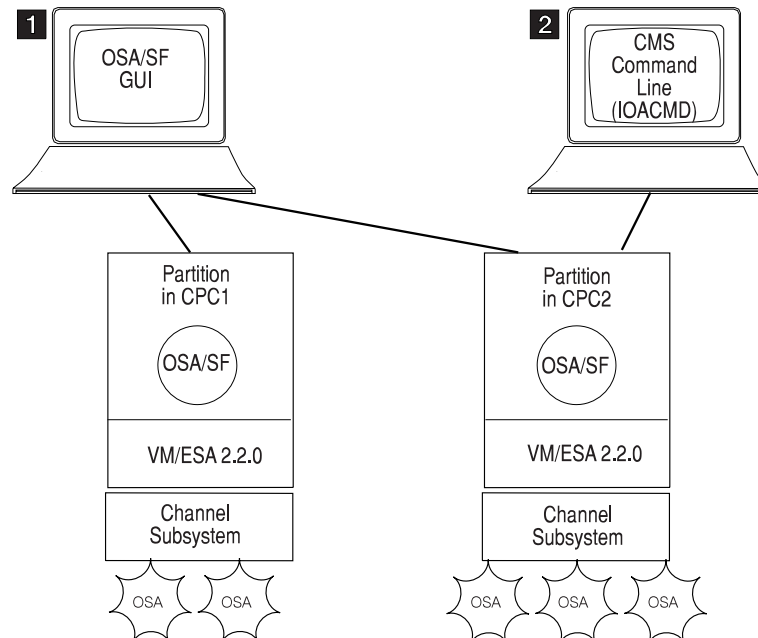


Figure 12. The OSA/SF GUI vs. the IOACMD Line Interface

### 1 OSA/SF GUI interface (OS/2 or Windows)

- Allows you to establish an active host session with as many “host” OSA/SF sessions as the OS/2 or Windows interface recognizes. Potentially, therefore, this interface allows OSA/SF’s span of control to cross CPC boundaries as shown in the preceding figure. The other

OSA/SF interfaces allow OSA/SF to manage only those OSAs the instance of OSA/SF running on their host can recognize its system hardware I/O configuration.

- Can be used for TCP/IP Passthru, and SNA modes.
- Offers the advantages of an application running on an OS/2 or Windows platform at a programmable workstation, including interactive function panels with pull-down menus and online help panels.
- Consists of files that are downloaded to an OS/2 or windows platform from the host operating system on which OSA/SF is running.
- Can establish a session with any “host” OSA/SF running on any host operating system with which the workstation can establish an active host session.
- If you plan to use the OSA/SF GUI interface (OS/2 or Windows), you must establish a communications protocol between the workstation on which the OSA/SF GUI interface is running and the host system on which OSA/SF is running.
  - For instructions on how to accomplish this task for OSA/SF for VM/ESA, see *VM/ESA: Open Systems Adapter Support Facility User's Guide* which is listed in the bibliography (page vii).
  - For guidelines on how to accomplish this task for OSA/SF for z/OS and OS/390, which can manage an OSA defined to VM, see the discussions in Chapter 3 for EHLAPPI (page 38), IP (page 39), and APPC (page 41).

## **2 REXX Execs at the CMS command line**

- Can be used for TCP/IP Passthru, and SNA modes.
- Is required to customize an OSA in the SNA mode when OSA/SF for VM/ESA is being used and you want to use the OSA as the communications controller between the host and OSA/SF GUI.
- Controls only those OSAs defined to the same host as the managing OSA/SF.

---

## **Planning for OSA/SF for VM Operations**

OSA/SF for VM/ESA, which is shipped via SES as a facility starting with VM/ESA 2.2.0, allows you to customize an OSA-2 to run in the TCP/IP Passthru and SNA modes. An OSA/SF APAR is available to customize an OSA-2 ATM in ATM Native mode.

OSA/SF for VM/ESA runs in its own virtual machine, usually called OSASF, which:

- Runs automatically unless it is shut down with the OSA/SF Shutdown command (page 55).
- Is disconnected until it receives an OSA/SF command that causes the server to be dedicated to that command.

## General Tasks

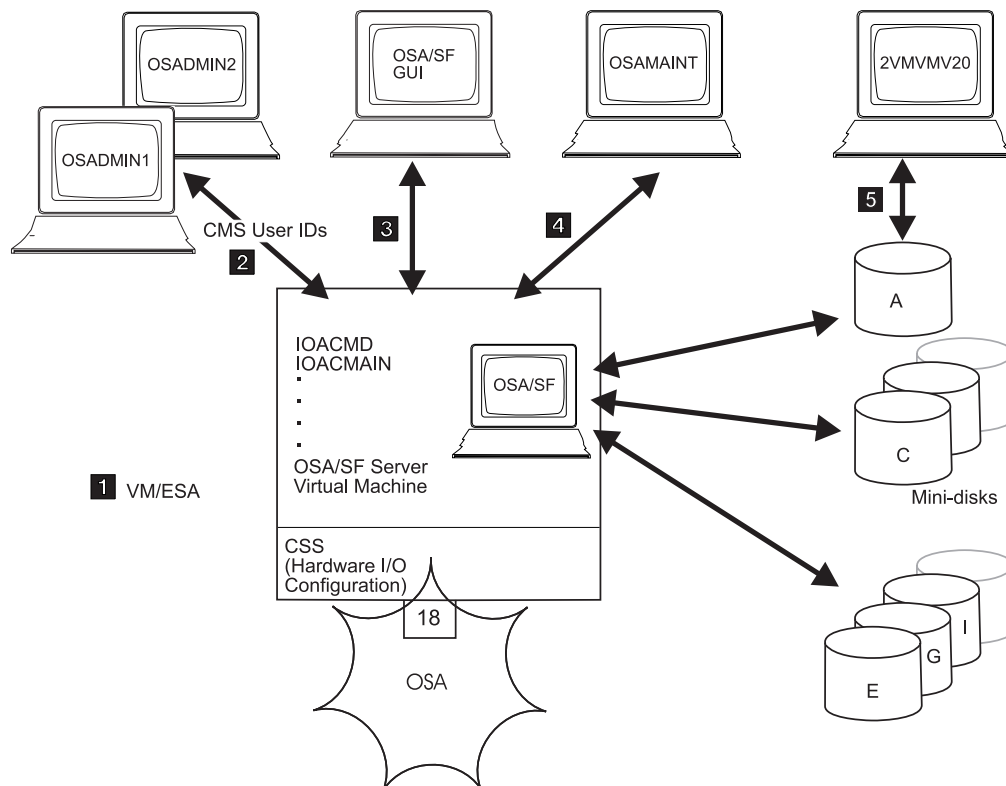


Figure 13. Setting Up OSA/SF for VM Support

- 1** In a VM/ESA 2.2.0 environment, assign the OSASF user ID to run the OSA/SF server virtual machine. OSA/SF for VM/ESA is shipped with a sample \$SERVER\$ NAMES file that contains this default user ID.

If an OSA-2 is being run in the SNA mode and you want to ensure that alerts are always recorded on OSASF, make sure the following steps are taken.

  - The OSASF server machine is added to the autolog list of VMs brought up during system IPL.
  - The PROFILE EXEC on OSASF must have the following two lines edited in:
 

```
'LOADMOD IOACMAIN'
'START'
```
  - Make the OSASF virtual machine exempt from inactivity forcing in a manner similar to PVM and RSCS.
- 2** To set up a CMS user ID, which access OSA/SF at the CMS Ready state, you must set up the server machine in the CMS user ID's UCOMDIR NAMES file. You must also add the CMS user ID in the OSA/SF \$SERVER\$ NAMES file. An example is shown below. For more information, refer to the VM books listed in the bibliography (page ix).

  - To set up the UCOMDIR NAMES file of CMS user ID **OSADMIN1** to contain the nickname of the OSA/SF service machine IOASERV:

```
:nick.IOASERV :luname.*userid OSASF
:tpn.IOASERV
```

- Conversely, to add the CMS user ID **OSADMIN1** in the OSA/SF \$SERVER\$ NAMES file:

```
:nick.IOASERV :list.OSADMIN1
:module.IOACMAIN
```

- 3 Ensure a communications protocol has been established with the platform on which OSA/SF GUI is to run, and download the OSA/SF GUI files. OSA/SF GUI is recommended for all OSA-2s (page 51).

For information on how to establish a communications protocol using an OSA in the SNA mode, refer to *VM/ESA: Open Systems Adapter Support Facility*, which is listed in the bibliography (page vii).

- 4 OSAMAIN is the user ID to which OSA/SF for VM/ESA sends its dumps and trace records. Do not change this ID.

- 5 At installation, establish a user ID to download data, including PTFs, to the disks that OSA/SF for VM/ESA uses. The default ID is **2VMVM20**.

- C Allocate 1 minidisk to represent each OSA that is defined to the CPC where OSA/SF for VM/ESA will run.

- Allocate 5 cylinders (3390 DASD) for each minidisk, and define it as **70cc**, replacing *cc* with the OSA-2 CHPID. Get the OSA CHPID from the *Placement Report* or *CHPID Report* produced by the IBM Configuration (CFSYSTEM) or the *Systems Assurance Product Review*, which may be available from your OSA marketing representative.
- If the OSA-2 channel path is defined as being shared among logical partitions, define the minidisks on Cross System Extensions (CSE) DASD.
- If an error has occurred in allocating the OSA minidisk, OSA/SF sends an error message to the VM error log, which can be handled in accordance with general VM procedures.

#### **A E G I**

Allocate additional space for, for example, the (A) OSASF's A disk, (B) OSA/SF production files, (G) cross-partition files, and (I) OSA/SF images. Refer to the OSA/SF for VM/ESA program directory for the number of cylinders needed.

## Notes on Handling Problems with OSA/SF

Handling problems with running OSA/SF follows the system procedures generally used for a VM facility. However, OSA/SF can also display OSA-related data, such as messages and dumps, that are not related to OSA/SF operations. It sends this data to the OSAMAIN ID that you have set up.

- If a problem seems to have occurred, make sure the managing OSA/SF is identified (page 49).

If OSA/SF GUI is being used, this can be done by clicking on the OSA/SF host icon and having the statistics notebook page displayed. A CMS user ID can issue the Query command.

- Check for OSA/SF messages, which are in the format of IOAxxyyz, where *x* denotes the OSA/SF component, *yyy* is the sequence number and *z* signifies the severity of the condition.

These messages are stored in the OSA/SF message log together with the OSA/SF commands and responses that have been issued. You can get the IOA messages with the OSA/SF Get Debug command.



- Tracing is a default operation for OSA/SF. You can, therefore, get the trace log by using the Get Debug command and specifying Trace log.
- OSA/SF can also be dumped as part of a system dump, which is sent to the OSA/SF OSAMAIN ID. its contents can be dumped as part of a system dump. When directed by support personnel, a dump of the host program with which an OSA is communicating will need to be taken as part of an system dump. Refer to the system books listed in the bibliography for more information.

## Controlling Access to OSA/SF for VM (RACF)

OSA/SF uses the System Authorization Facility (SAF) interface to let you optionally control user access to its commands. In the following OSA-specific planning information, RACF is assumed to be used. (If RACF is installed, OSA/SF assumes it is active.) For more information on RACF, refer to the manuals listed in the bibliography (page ix).

If OSA/SF for VM/ESA is being used, authorize OSA/SF (OSASF user ID) to issue RACROUTE requirements as indicated in the following list.

1. Update the CP directory entry for the OSASF user ID to include an inter-user communication vehicle (IUCV) line that allows communications with the RACF service machine. Use either ANY or the name of the RACF VM/ESA server machine.

```
IUCV any_or_racf_server_machine PRIORITY MSGLIMIT 255
```

2. If not already defined, define a profile with the name ICHCONN in the class Facility:

```
RAC RDEFINE FACILITY ICHCONN UACC(NONE)
```

3. Authorize OSA/SF to issue RACROUTE requests:

```
RAC PERMIT ICHCONN CLASS(FACILITY) ID(OSASF) ACCESS(UPDATE)
```

4. If the Facility class is not active, activate it:

```
RAC SETROPTS CLASSACT(FACILITY)
```

OSA/SF supports the None, Read, Update, and Control RACF levels of authority. The minimum authority level that is required for each command is listed in the next table. The **Configure OSA** command, which is not included in this list, uses many of the commands listed to accomplish its tasks. Although **Configure OSA** does not require RACF authority itself, many of the commands it uses do. Providing authority for all the commands in the table will assist with any problem determination in the future.

More information on the commands is provided in *VM/ESA: Open System Adapter Support Facility User's Guide*, which is listed in the bibliography (page vii).

| Command     | Task                                                                                                                               | RACF Facility   | Level   |
|-------------|------------------------------------------------------------------------------------------------------------------------------------|-----------------|---------|
| Clear Debug | Clear the OSA/SF message log.                                                                                                      | IOA.CLEAR.DEBUG | Control |
| Get Config  | Get the ATM configuration data on an OSA-Express. This command does not apply to OSA-2.                                            | IOA.GET.CONFIG  | Read    |
| Get Debug   | Get the OSA/SF log of IOA messages and OSA/SF trace table. From the OSA CHPID, get a memory dump, SNA traces, and SNA message log. | IOA.GET.DEBUG   | Read    |

| Command                 | Task                                                                                                                                                                                                                                                                                                | RACF Facility      | Level   |
|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|---------|
| Get Table               | Get the entries of an OSA Address Table (OAT). This command can be issued only through IOACMD at the CMS command line.                                                                                                                                                                              | IOA.GET.TABLE      | Read    |
| Install                 | Create and install (or activate) an OSA mode configuration.                                                                                                                                                                                                                                         | IOA.INSTALL        | Control |
| Put Table with Force    | Update and store an OAT disregarding whether an entry is in use. This command can be issued only through IOACMD at the CMS command line.                                                                                                                                                            | IOA.PUT.TABLE      | Control |
| Put Table without Force | Update and store an OAT only if an entry is not in use. This command can be issued only through IOACMD at the CMS command line.                                                                                                                                                                     | IOA.PUT.TABLE      | Update  |
| Query                   | Get data about an OSA, OSA/SF, and/or active OSA modes on an OSA.                                                                                                                                                                                                                                   | IOA.QUERY          | Read    |
| Set Parameters          | Set the OSA LAN port parameters that are settable with OSA/SF.                                                                                                                                                                                                                                      | IOA.SET.PARAMETERS | Control |
| Shutdown                | Shuts the OSA/SF virtual server machine down, releases all OSA/SF resources, and logs the OSA/SF server virtual machine off. The OSA/SF server virtual machine is automatically restarted by any subsequent OSA/SF command. This command can only be issued through IOACMD at the CMS command line. | IOA.SHUTDOWN       | Control |
| Start Managing          | Start managing an OSA by this instance of OSA/SF even if that forces another instance of OSA/SF to stop management.                                                                                                                                                                                 | IOA.START.MANAGING | Control |
| Stop Managing           | Stop managing the specified OSA by OSA/SF.                                                                                                                                                                                                                                                          | IOA.STOP.MANAGING  | Update  |
| Synchronize             | Synchronize (set) the OAT entries and settable port parameters known by the managing OSA/SF with those on the specified OSA. (Match OSA/SF to the OSA feature.)                                                                                                                                     | IOA.SYNC           | Update  |

## Some Examples of RACF Profile Definitions

When defining a RACF profile generically or for an individual OSA/SF command, use the RACF RDEF command with a class of FACILITY. Enter the fully qualified facility name, starting with the characters IOA and using periods as separators, as shown in the following examples. For more information on the RACF commands, see the RACF commands books listed in the bibliography (page ix).

- To define a profile for an individual OSA/SF command, for example, the Get Table command to read an OAT, enter: **RDEF FACILITY IOA.GET.TABLE**
- To define a profile to allow user IDs to enter this command, enter:  
**RDEF FACILITY IOA.GET.TABLE UACC(READ)**
- To allow the use of generics for a class of service facility, enter: **SETROPTS GENERIC FACILITY**
- To prevent unauthorized use of OSA/SF commands, enter: **RDEF FACILITY IOA.\* UACC(NONE)** If you have already prohibited all user IDs from using OSA/SF commands, you must explicitly assign RACF authorization to allow designated user IDs to enter an OSA/SF command.

## Some Examples of RACF Authorization Assignments

Enter the RACF PERMIT command and its parameters. The profile parameter, for example, IOA.GET.TABLE or \*, determines the authorization level of the user ID identified in the ID parameter. (The Access parameter identifies the authorization given. You can use an asterisk to designate a generic class on the PERMIT parameters.)

- To allow all users to send all commands that require the Read authority, enter:

```
PERMIT IOA.* ACCESS(READ) CLASS(FACILITY) ID(*)
```

- To assign authorization by Access level, for example, to authorize user ID NAMEROW to access the Control level, enter:

```
PERMIT IOA.* ACCESS(CONTROL) CLASS(FACILITY) ID(NAMEROW)
```

And, to authorize another user (SALLY) to enter all commands that require the update authorization, enter:

```
PERMIT IOA.* ACCESS(UPDATE) CLASS(FACILITY) ID(SALLY)
```

- To assign authorization by specific OSA/SF commands, for example, to authorize all user IDs to enter the Get Table command, enter:

```
PERMIT IOA.GET.TABLE ACCESS(READ) CLASS(FACILITY) ID(*)
```

- To authorize ID RAICHER to enter any command requiring the Update control option, enter:

```
PERMIT IOA.* ACCESS(UPDATE) CLASS(FACILITY) ID(RAICHER)
```

- To authorize a specific profile name, for example, to authorize user ID OMAR to enter the Put Table command with or without the Force option, enter:

```
PERMIT IOA.PUT.TABLE ACCESS(CONTROL) CLASS(FACILITY) ID(OMAR)
```



---

## Chapter 5. OSA in a VSE/ESA Environment

Starting with VSE/ESA 2.2.1, a token ring or FDDI OSA-2 can be defined in a VSE/ESA environment on an S/390 or z900 and customized, or configured, to be run in the OSA SNA mode, the TCP/IP Passthru mode, or in both modes concurrently.

In this chapter, guidelines are provided to help you plan for an OSA-2 in the VSE/ESA environment within the context of this OSA-centric book. For more information on VSE/ESA, refer to the VSE/ESA books listed in the bibliography (page xi).

**A few words about some terms.** In the other chapters of this book, partition is used interchangeably with logical partition (LP). Both terms are used not only in the context of a hardware system that is running in logically-partitioned (LPAR) mode, but are also used to include a system in basic mode unless a statement exempting that system is made.

In this chapter on VSE/ESA, the following terms are used.

- *Basic mode* is the mode in which a hardware system is running when it is not in LPAR mode and therefore has no logical partitions.
- A *logical partition* (LP) is a division of the hardware system in which a system image is running when the hardware system is running in logically partitioned (LPAR) mode.
- *Native* signifies that a VSE/ESA system image is running on a hardware system that is in basic mode.
- *Native in LPAR mode* signifies that a VSE/ESA system is running on a hardware system that is in LPAR mode.
- A *VSE/ESA partition* is either a static or dynamic partition of the VSE/ESA system image.

---

### Task Planning Checklists

Two checklists are provided: one for OSA and one for OSA/SF for VSE/ESA. In addition, system-independent checklists are provided for the TCP/IP Passthru mode (page 79) and the SNA mode (page 102).

### General Checklist

- \_\_\_ 1. Ensure the hardware and programming requirements for each OSA-2 are met (page 62).
- \_\_\_ 2. Ensure the hardware requirements for each OSA-2 port, which are described in Chapter 2, are met.  
Each FDDI OSA-2 has one port (port 0). Each token ring OSA-2 has two ports (ports 0 and 1).
- \_\_\_ 3. If you intend to set a locally-administered medium access control (MAC) address for an OSA port, consider doing so when the OSA-2 is installed because the OSA channel path must be reconfigured (reset) to activate the change.
  - You can set a local MAC address for any OSA port using OSA/SF. The PTF resolution to OSA/SF for VSE/ESA APAR PQ11504 is required for a token ring OSA-2 port.

Refer to the information on page 128 and to *OSA/SF for VSE/ESA User's Guide*, which is listed in the bibliography (page xi).

- You can set a local MAC address for a FDDI or token ring OSA-2 port using the standalone support element or single object operations via the hardware management console.

Refer to the information on page 128 and the CMOS books that are listed in the bibliography.

- \_\_\_ 4. Ensure the frame protocol to be used in each OSA mode is supported by the OSA-2 to be used. See page 75 (TCP/IP Passthru mode) and page 101 (SNA mode).

- \_\_\_ 5. Decide whether OSA/SF will be used. OSA/SF is recommended for all OSAs.

To be run in the TCP/IP Passthru mode, a token ring or FDDI OSA-2, however, does not require OSA/SF if access to the OSA ports is not to be shared among logical partitions, the OSA is to be run only in the TCP/IP Passthru mode, and no default inbound data paths are to be defined for it.

- \_\_\_ 6. If OSA/SF is to be used, decide which instance, or copy, will be used, and plan for its installation and use.

- OSA/SF for VSE/ESA allows you to use OSA/SF on a VSE/ESA system image. A separate planning checklist for OSA/SF for VSE/ESA is provided in this chapter (page 61).

If you intend to use OSA/SF for VSE/ESA and the VSE/ESA system image is running as a guest in a VM/ESA environment, refer to page 46 for additional information.

- If you use OSA/SF on OS/390 or MVS/ESA to customize an OSA-2 that is defined to a logical partition in which VSE/ESA is running, refer to the information on this program in Chapter 3.
- If you use OSA/SF for VM/ESA to customize an OSA-2 defined to a logical partition in which VSE/ESA is running, refer to OSA/SF for VM/ESA information in Chapter 4.

- \_\_\_ 7. Define each OSA CHPID with its associated logical control unit number and devices in the system hardware I/O configuration (IOCDS) using IOCP statements (page 67).

- \_\_\_ 8. To customize an OSA to be run in the TCP/IP Passthru mode:

- a. Define one pair of logical device numbers in the system hardware I/O configuration and to VSE/ESA (page 68) for each OSA port involved. These pairs of devices can be shared across logical partitions if the OSA channel path is defined to be shared by those logical partitions.
- b. Define the OSA in each TCP/IP for VSE/ESA initialization member to be used.
- c. Either use the IBM-supplied TCP/IP Passthru OAT entries or create appropriate ones if you define a default inbound data path or specify that access to this OSA port will be shared either by more than one host program (page 5).
- d. Activate the Passthru OAT on the OSA-2 if you created an OAT entry using OSA/SF, taking care to configure the OSA channel path and its devices off and on. See the *OSA/SF User's Guide*, which is listed in the bibliography (page viii).

- \_\_\_ 9. To customize an OSA to be run in the SNA mode:

- a. Define one logical device number in the system hardware I/O configuration (page 67) and to VSE/ESA (page 68) for each OSA port involved. This device can be shared across logical partitions if the OSA channel path is defined to be shared by those logical partitions.
- b. Define the VTAM nodes involved in the SNA communication. Take care to match the OSA-related parameters that are specified in the hardware I/O configuration and OSA/SF.
- c. Create an OAT SNA entry for each OSA port and logical partition, or system in basic mode.
- d. If you want this OSA to be monitored in the SNA mode by an SNA network management service, such as NetView, make sure the relevant requirements listed for the SNA mode are met, and refer to Chapter 8 for more information.
- e. Review the SNA port timers (page 106). Change them if needed.
- f. Activate the SNA image on the OSA taking care to configure the OSA channel path and its devices off and back on. See *OSA/SF User's Guide* which is listed in the bibliography (page viii).

## OSA/SF for VSE/ESA Checklist

- \_\_\_ 1. Decide which OSA/SF interface to use and make sure its requirements are met (page 63).
- \_\_\_ 2. Make sure the requirements for each function or OSA mode are met.
- \_\_\_ 3. Create the appropriate OAT entries.
- \_\_\_ 4. Plan to control user access to the OSA/SF commands. Use the access control table DTSECTAB that is described in *VSE/ESA Administration* which is listed in the bibliography (page xi).

Here is a list of the OSA/SF commands that are supported by OSA/SF for VSE/ESA. For information on the syntax and usage of these commands, see *VSE/ESA OSA/SF User's Guide* which is listed in the bibliography (page viii).

| Command                    | Task                                                                                                                                                            |
|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Clear Debug                | Clear the OSA/SF message log.                                                                                                                                   |
| Get Debug                  | Get the OSA/SF log of IOA messages and OSA/SF trace table. From the OSA CHPID, get a memory dump, SNA traces, and SNA message log.                              |
| Get OATTable               | Get the entries of an OSA Address Table (OAT). This command can be issued only with an IOACMD job (page 68).                                                    |
| Install                    | Create and install (or activate) an OSA mode configuration.                                                                                                     |
| Put OATTable with Force    | Update and store an OAT disregarding whether an entry is in use. This command can be issued only with an IOACMD job (page 68).                                  |
| Put OATTable without Force | Update and store an OAT only if an entry is not in use. This command can be issued only with an IOACMD job (page 68).                                           |
| Query                      | Get data about an OSA, OSA/SF, and/or active OSA modes on an OSA.                                                                                               |
| Set Parameters             | Set the OSA LAN port parameters that are settable with OSA/SF. (On the OS/2 interface, or GUI, this function underlies the Set pushbuttons.)                    |
| Start Managing             | Start managing an OSA by this instance of OSA/SF.                                                                                                               |
| Stop Managing              | Stop managing the specified OSA by OSA/SF.                                                                                                                      |
| Synchronize                | Synchronize (set) the OAT entries and settable port parameters known by the managing OSA/SF with those on the specified OSA. (Match OSA/SF to the OSA feature.) |



- \_\_\_ 5. If OSA/SF for VSE/ESA is used, ensure that its installation and operational requirements are met (page 63).
- \_\_\_ 6. Plan to manage problems that can occur using OSA/SF. Follow the system procedures that you use for a VSE/ESA system. Note that OSA/SF can display OSA-related data, such as messages and dumps.
  - If a problem has apparently occurred, make sure the managing OSA/SF is identified.

If OSA/SF GUI is being used, this can be done by clicking on the OSA/SF host icon and having the statistics notebook page displayed using the OSA/SF Query command.
  - Check for OSA/SF messages, which are in the format of IOAxxyyz, where *x* denotes the OSA/SF component, *yyy* is the sequence number and *z* signifies the severity of the condition.

These messages are stored in the OSA/SF message log together with the OSA/SF commands and responses that have been issued. You can get the IOA messages with the OSA/SF Get Debug command.
  - Tracing is a default operation for OSA/SF. If a trace is needed, the IBM support center will request that you get the trace log by using the Get Debug command and specifying Trace log.
  - When directed by support personnel, a dump of the host program with which an OSA is communicating will need to be taken as part of a system dump. Refer to the VSE books listed in the bibliography for more information.

---

## Requirements in a VSE/ESA Environment

The requirements for an OSA in a VSE/ESA environment are listed under three headings in this chapter: OSA-2 requirements, VSE/ESA system requirements, and OSA/SF for VSE/ESA requirements. For more information, refer to the VSE/ESA books listed in the bibliography (page xi).

### OSA Requirements

- OSA-2 hardware and user-cabling requirements are described in Chapter 2.
- Frame protocol requirements and maximum number of users are listed on page 75 (TCP/IP Passthru mode) and page 101 (SNA mode)
- If the VSE/ESA OS/2 interface (GUI) is to be used, communications with the OSA/SF host component requires a communication adapter that is supported by OS/2 and the workstation microprocessor to support the EHLLAPI for 3270 communications protocol.
- OSA/SF OS/2 interface (GUI) requires:
  - A workstation with at least an 80386SX, 16MHz microprocessor. (An 80486 microprocessor is recommended.)
  - Sufficient memory to support IBM Operating System/2 3.0, or later. (8MB or more of memory is recommended.)
  - Approximately 14MB of free disk space to download the OSA/SF GUI files to, and unpack them on, the workstation. About 4MB of these files can then be erased. About 9MB remains as a requirement to run OSA/SF GUI.
- You will need to use the standalone support element or single object operations via the hardware management console to reconfigure (reset) an OSA-2 channel path and its devices. If a VSE/ESA system image is running as a guest under VM/ESA, the host VM/ESA's CHPID management support can be used.

## VSE/ESA Requirements

### ***Minimum system level is VSE/ESA 2.2.1.***

- OSA/SF is a component of VSE/ESA Central Functions 6.1.1 for VSE 2.2.1, and of VSE/ESA Central Functions 6.3 for VSE/ESA 2.3.
- Service levels and higher release levels are assumed to be supported. Although some key APAR numbers are listed, a complete list is not provided in this book.
- For more information, refer to the OSA/SF on VSE/ESA preventive service planning (PSP) buckets. Use either the OSA/SF/1G7 PSP subset ID of the VSEESA221 upgrade PSP bucket or check IBMLink (Service level) and use those Upgrade and Subset values.
- Note that TCP/IP for VSE/ESA 1.3 is integrated in VSE/ESA 2.3.

### ***OSA/SF instances that can be used:***

- OSA/SF for VSE/ESA can be used. For the SNA mode, the minimum level is OSA/SF for VSE/ESA as a component of VSE/ESA Central Functions 6.1.1 for VSE/ESA 2.2.1. For the SNA mode, the minimum level is OSA/SF for VSE/ESA as a component of VSE/ESA Central Functions 6.3 for VSE/ESA 2.3.
- OSA/SF for z/OS or OS/390 V2R6 can be used.
- OSA/SF for VM/ESA 2.2 can be used.

### ***For the SNA mode:***

- VTAM 4.2 (5686-065) with the PTF UD50298 resolution to APARs DY44152 and DY44300 is required.
- The PTF resolution to OSA/SF for VSE/ESA APAR PQ11504 is required to support the expanded set of SNA mode port parameters (page 106).
- A maximum number of 2047 PUs is supported for an OSA-2 if the PTF resolution to VSE APAR DY44347 is applied plus the appropriate OSA/SF for VSE/ESA APARs as listed in the following items.
- NetView is optionally supported.
  - NetView for VSE/ESA 2.3 (5686-055) is required for the Box Manager node support that is required for NetView CSCF. This is the only NetView support available on a token ring or a FDDI OSA-2.
- For a FDDI OSA-2, the PTF resolution to OSA/SF for VSE/ESA APAR PQ03091 is required to support a maximum number of 2047 PUs.
- For a token ring OSA-2, the PTF resolution to OSA/SF for VSE/ESA APAR PQ03091 is required to support a maximum number of 2047 PUs.

### ***For the TCP/IP Passthru mode:***

- TCP/IP for VSE/ESA 1.3 is required.
- If OSA/SF for VSE/ESA is to be used, the PTF resolution to OSA/SF for VSE/ESA APAR PQ06993 must be applied.
- The PTF resolution to OSA/SF for VSE/ESA APAR PQ16071 is required for an expanded Passthru OAT entry, which allows multiple Home IP addresses to be specified in the same inbound Passthru entry, which is the Passthru entry that you specify, as well as both primary and secondary default inbound data paths to be specified in the TCP/IP Passthru mode (page 77).

## OSA/SF for VSE/ESA Requirements

OSA/SF for VSE/ESA is delivered as a central function of VSE/ESA starting with VSE/ESA 2.2.1. For more information than provided in this chapter, refer to *OSA/SF User's Guide for VSE/ESA* which is listed in the bibliography (page viii).

## Corequisite

The “VSE C Language Run-Time Support”, which is part of the IBM Language Environment (LE), is required. LE is automatically shipped and installed with VSE/ESA 2.3. Prior to VSE/ESA 2.3, it is delivered on the VSE/ESA optional product “IBM Language Environment for VSE 1.4 (LE/VSE)” (5686-094).

## OSA/SF GUI Requirements

Either OS/2 or OS/2-J is required. Although the CICS (MVS/VSE) File Transfer Program V2 (APVUFILE), product number 5799-PGZ is required for EHLAPPI, that FTP is included in VSE/ESA 2.2.1.

**If OS/2 is used**, OS/2 3.0 (WARP) is required plus EHLLAPI as the communications protocol. EHLLAPI requires VTAM 4.2 running on the VSE/ESA system image and one of the following on the workstation being used:

- Communications Manager/2 1.11.
- Personal Communications/3270 4.1 with the PTF resolution to APAR IC14272.

**If OSA/2-J is used**, OS/2-J 3.0 (WARP) is required plus the PTF resolution for OSA/SF for VSE/ESA APAR PQ07521. EHLLAPI (3270) is required as the communications protocol, which requires Communications Manager/2-J 1.11 on the workstation being used and VTAM 4.2 on the VSE/ESA system image.

## DASD Requirements

- The storage requirements for PRD2.PROD, which is the library that is recommended for OSA/SF data and work files, depends on your configuration.
- The storage requirements for the executable OSA/SF for VSE/ESA code in PRD2.PROD are listed in the following table.

|             | Library blocks | 3375 cylinders | 3380 cylinders | 3390 cylinders | 9345 cylinders | FBA blocks |
|-------------|----------------|----------------|----------------|----------------|----------------|------------|
| Minimum     | 10851          | 37             | 24             | 22             | 26             | 21702      |
| Recommended | 13021          | 44             | 28             | 26             | 31             | 26042      |

## VSE/ESA Partition Requirements

The following storage is required for OSA/SF for VSE/ESA to run in either a static or dynamic VSE/ESA partition. These numbers reflect a system that has the maximum number of OSA features installed.

| OSA/SF Job Name | VSE/ESA Partition Requirements        |        |
|-----------------|---------------------------------------|--------|
| IOAMAIN         | ALLOC=9.0MB, SIZE=0.6MB, GETVIS=8.4MB | Note 1 |
| IOACMD          | ALLOC=8.5MB, SIZE=1.1MB, GETVIS=7.4MB |        |
| IOAHRUN         | ALLOC=2.5MB, SIZE=0.2MB, GETVIS=2.3MB | Note 2 |

### Notes:

1. The size of the IOAMAIN job, which is always required, depends on the number of OSA-2s defined. The maximum size is listed.
2. The IOAHRUN job is started automatically if and when the OSA/SF OS/2 interface (GUI) communicates with IOAMAIN.

## Installation Requirements

Note that OSA/SF for VSE/ESA must be stored in PRD2.PROD. You must also define a working sublibrary for the OSA/SF data and work files. It is recommended that you use the name **PRD2.OSASF**.

1. Start with the *VSE/ESA Function Selection* panel, select **Installation - V2 Format** followed by **Prepare for Installation**. This dialog creates a job stream that scans the VSE/ESA optional programs distribution tape and reports the library space that is required. For information on this dialog, refer to *VSE/ESA Administration*, which is listed in the bibliography (page xi).
2. Start with the *VSE/ESA Function Selection* panel, select **Installation - V2 Format** followed by **Install Program(s) from Tape**. This dialog displays a full list of the products and components on the tape. For OSA/SF for VSE/ESA, it lists the recommended target library. If the following library names are *not* shown, amend them:

```
Library name ..... PRD2
Sublibrary name ... PROD
```

Complete the dialog by pressing Process (PF5) to create a job stream that runs the OSA/SF for VSE/ESA installation.

3. Define the library for OSA/SF for VSE/ESA data and work files via LIBR as follows: DEF S=PRD2.OSASF
4. Activate OSA/SF for VSE. Refer to *VSE/ESA Central Functions Open Systems Adapter Support Facility User's Guide* which is listed in the bibliography (page viii).

To install the OSA/SF for VSE/ESA OS/2 interface (GUI), refer to *VSE/ESA Central Functions Open Systems Adapter Support Facility User's Guide* which is listed in the bibliography (page viii). However, if you use an OSA as the communication controller, bear the following points in mind.

- The OSA must adhere to the requirements for OSA/SF GUI (page 62).
- The OSA must first be customized in the SNA mode.

If you do not have OSA/SF GUI available on a workstation that you can use, you must use the OSA/SF SNA Exec, which is documented in the OSA/SF User's Guide (page viii). Additionally, you must run either an IOACMD job. OSA must be set up through VTAM. In addition to the statements shown for the following example, you will need to add a VTAM application for **OSAMACB** as described in *VSE/ESA Central Functions Open Systems Adapter User's Guide* which is listed in the bibliography (page viii).

---

## An Example to Show How the Definitions Fit Together

In Figure 14 on page 67, the relationships among the OSA-related definitions are demonstrated.

### ***Here are the assumptions for the example.***

1. A token ring OSA-2 has been installed and is available in CHPID slot X'84'. For a description of an token ring OSA-2, refer to page 23.
2. VSE/ESA 2.2.1 is running natively in logically partitioned (LPAR) mode and is defined to only two logical partitions (LPs): LPLEFT (LP 1) and LPRIGHT (LP 2).  
Both (all) the LPs are defined to be shared by the OSA. If a processor contains more LPs that would be defined for OSA, you would define the LPs that are defined for OSA in a candidates list (page 18).
3. Each port of the OSA is attached through its lower (TR) RJ-45 connector to a different token-ring LAN segment. This means they can be specified as participating members of the same SNA session enhancement group (page 109).

4. The system is running in logically-partitioned (LPAR) mode and the CHPID (X'84') is defined to be shared between the only two logical partitions (LPs) that the CPC has (LPLEFT and LPRIGHT).
5. Although a block of 16 device numbers, which starts with X'0960' is assigned to this CHPID, only the device numbers for the TCP/IP Passthru mode through both ports, the SNA mode through port 1, and the device for OSA/SF communications are discussed here.

The device assignments are X'0960'–X'0963' for the two pairs devices used in the TCP/IP Passthru mode; X'0965' for the device used in the SNA mode; and X'096F' for the OSA/SF device for OSA/SF that is installed and operational in LPLEFT (LP 1).

Each unit address equates with the last two digits of the device number with which it is associated with the exception of the OSA/SF device whose unit address is X'FE'.
6. The three Home IP addresses are: 9.164.180.16 (LP 1 through port 0); 9.164.180.15 (LP 1 through port 1); 9.164.180.14 (LP 2 through port 1). Network set up for IP clients falls outside the scope of this book. For that information, refer to *TCP/IP for VSE/ESA User's Guide* which is listed in the bibliography (page xi).
7. Only one OSA configuration, **BOEVSE84**, is created for the OSA to be run in the TCP/IP Passthru and SNA modes concurrently.
8. To simplify the example, only one VTAM PU is shown with only one LU. Only one TCP/IP network client is shown for each token-ring LAN segment.

**The labeled arrows** used in the figures and the text should help you to keep track of which parameters are need for the IOCP statements, VSE/ESA, the TCP/IP for VSE/ESA initialization member (TCP/IP Passthru mode), VTAM macros (SNA mode), and the OSA/SF for VSE/ESA commands.

Although these definitions are discussed in the following sections, it falls outside the scope of this book to provide detailed IOCP, VSE/ESA, VTAM, and OSA/SF instructions. For that information, refer to the appropriate books that are listed in the bibliography (page ix).

## System I/O Definitions

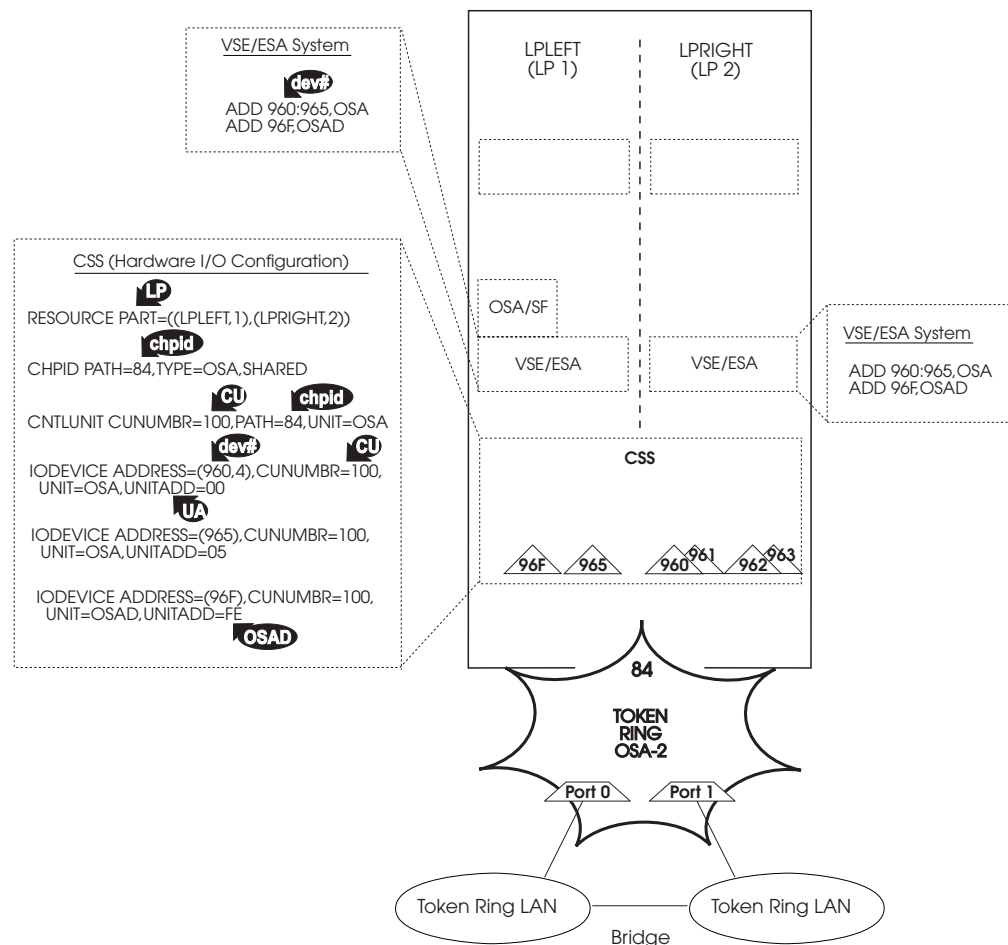


Figure 14. How the Definitions Fit Together

## Where to Specify I/O Devices to the System

You must define an OSA CHPID in the system hardware I/O configuration (IOCDs) and associate one control unit plus whatever device numbers are required. You must also add these associated device numbers to each VSE/ESA system image involved.

To define an OSA in the system hardware I/O configuration, you must use IOCP statements because an OSA requires the EXEC statement IYPIOCP. Therefore, you cannot use the VSE/ESA skeleton SKIOCPN in ICCF library (59), which uses the EXEC statement IXPIOCP in its example, unless of course you change the SKIOCPN JCL to use IYPIOCP. For information on IOCP statements, see page 17. For complete information, however, refer to *IOCP User's Guide* which is listed in the bibliography (page ix).

## Ways to Add OSA Device Numbers

There are two ways to add device numbers to a VSE/ESA system image.

- If PTFs UQ000864 and UQ000865 have been installed for APARs PN91985 and PN91988, respectively, you can select **Fastpath 241** to get to the *Configure Hardware* dialog and add the device numbers to VSE/ESA that way.



You must, of course, have the highest authority level, which is usually reserved for the system programmer under user ID **SYSA**.

- Alternatively, you can code the device numbers for VSE/ESA manually for each logical partition in the VSE/ESA \$IPLESA.PROC member in the IJSYSRS.SYSLIB library. Note, however, that these definitions are lost once you use the *Configure Hardware* dialog.

For information on defining devices to VSE/ESA, see the VSE/ESA books listed in the bibliography (page xi). Note that VSE/ESA views an OSA device as a telecommunications device.

## Notes on OSA Devices

1. VSE/ESA accepts only 3-digit device numbers. OSA/SF accepts 4-digit device numbers and pads a 3-digit device with a leading zero in its output.
2. Define the same device numbers in the system hardware I/O configuration and to VSE/ESA. For more information on IOCP definitions, refer to the discussion that starts on page 20.

You can, of course, define a block of device numbers. In keeping with the other examples in this book, device numbers xx00–03 are used for the TCP/IP Passthru mode, xx04–05 for the SNA mode, and xx0F for OSA/SF communications. Only these device numbers are shown in the figure.

3. Define one device number for OSA/SF with type=OSAD and unit address X'FE'. In the example, this device number is X'096F'.
4. If the OSA channel path is defined to be shared, as is the case in the example, you only need to associate devices for data transfer through each port. All the logical partitions will share the same devices.
5. If the OSA is to be run in the TCP/IP Passthru mode, define one even/odd, read/write pair of device numbers with type=OSA for each port to be used in this mode.

In the example, device numbers X'0960' and X'0961' are associated with port 0, and X'0962' and X'0963' with port 1. For more notes on device assignments in this mode, refer to page 80.

6. If the OSA is to be run in the SNA mode:
  - Define one device with type=OSA per port to be used in this mode.  
In the example, only port 1 of the token ring OSA-2 is to be used for data transfer in the SNA mode. Therefore, only one device, X'0965', is associated with the OSA channel path for this mode. For more notes on device assignments in this mode, refer to page 103.
  - If you use NetView and need a Box Manager node to communicate with it, define an additional device number with type=OSA for the virtual port X'FF' (page 103).
7. In the system hardware I/O configuration, associate a unit address with each device number that you specify.
  - The IBM-supplied default unit addresses for an OSA in the TCP/IP Passthru mode are X'00' and X'01' for port 0 and X'02' and X'03' for port 1.
  - You can specify a unit address from X'00' through X'FB'.
  - Specify the unit address (UA) either explicitly with the UNITADD parameter or implicitly as the last two digits of the device number.
8. If the VSE/ESA system image is running as a VM/ESA guest, make sure the device assignments match with the host VM/ESA system (pages 46 and 50).



## TCP/IP for VSE/ESA Definitions

To be run in the TCP/IP Passthru mode, an OSA must be defined in the TCP/IP for VSE/ESA initialization member. For more information on these definitions, refer to *TCP/IP for VSE/ESA User's Guide* which is listed in the bibliography (page viii). More information on the TCP/IP Passthru mode is provided on page 85 but note that the examples in that chapter assume z/OS, OS/390, or VM/ESA as the programming system, which use TCP/IP Profile statements, not the TCP/IP for VSE/ESA initialization member statements.

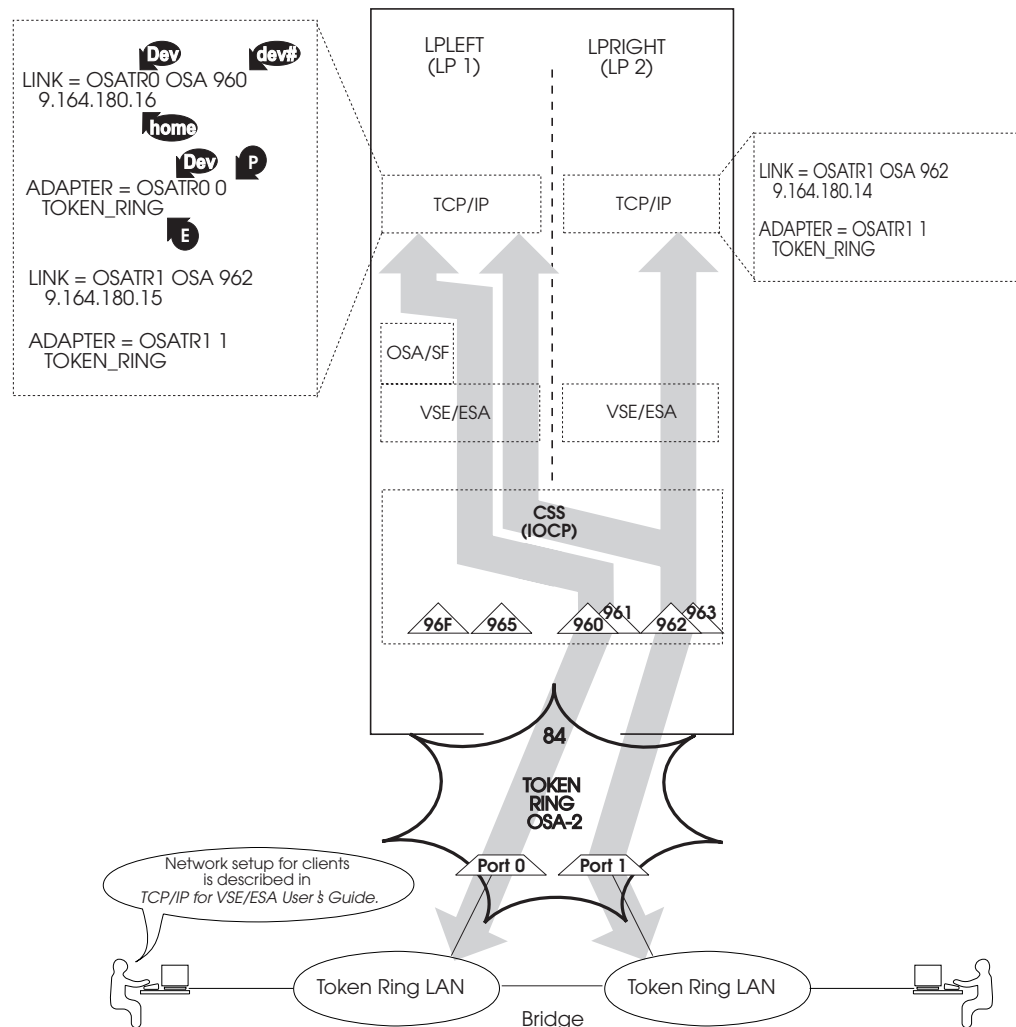


Figure 15. TCP/IP Definitions Required for VSE/ESA

### LPLEFT (LP 1) TCP/IP Definitions

The TCP/IP for VSE/ESA that is running in LPLEFT (LP 1) has sole access to port 0. It shares access to port 1 with VTAM in both LPs and with TCP/IP for VSE/ESA in LP 2. Only the OSA-related definition statements for the TCP/IP initialization member are listed below.

*For port 0*

```
DEFINE LINK, ID=OSATRO, TYPE=OSA, DEV=960, IPADDR=9.164.180.16, MTU=1500
DEFINE ADAPTER, LINKID=OSATRO, NUMBER=0, TYPE=TOKEN-RING
```

*For port 1*

```
DEFINE LINK, ID=OSATR1, TYPE=OSA, DEV=962, IPADDR=9.164.180.15, MTU=1500
DEFINE ADAPTER, LINKID=OSATR1, NUMBER=1, TYPE=TOKEN-RING
```

## LPRIGHT (LP 2) TCP/IP Definitions

TCP/IP for VSE/ESA running in LPRIGHT (LP 2) shares access to the port 1 with VTAM in both LPs and with TCP/IP for VSE/ESA in LPLEFT (LP 1). The OSA-related definition statements for the TCP/IP initialization member are listed below.

*For port 1*

```
DEFINE LINK, ID=OSATR1, TYPE=OSA, DEV=962, IPADDR=9.164.180.14, MTU=1500
DEFINE ADAPTER, LINKID=OSATR1, NUMBER=1, TYPE=TOKEN-RING
```

## VTAM Macro Definitions

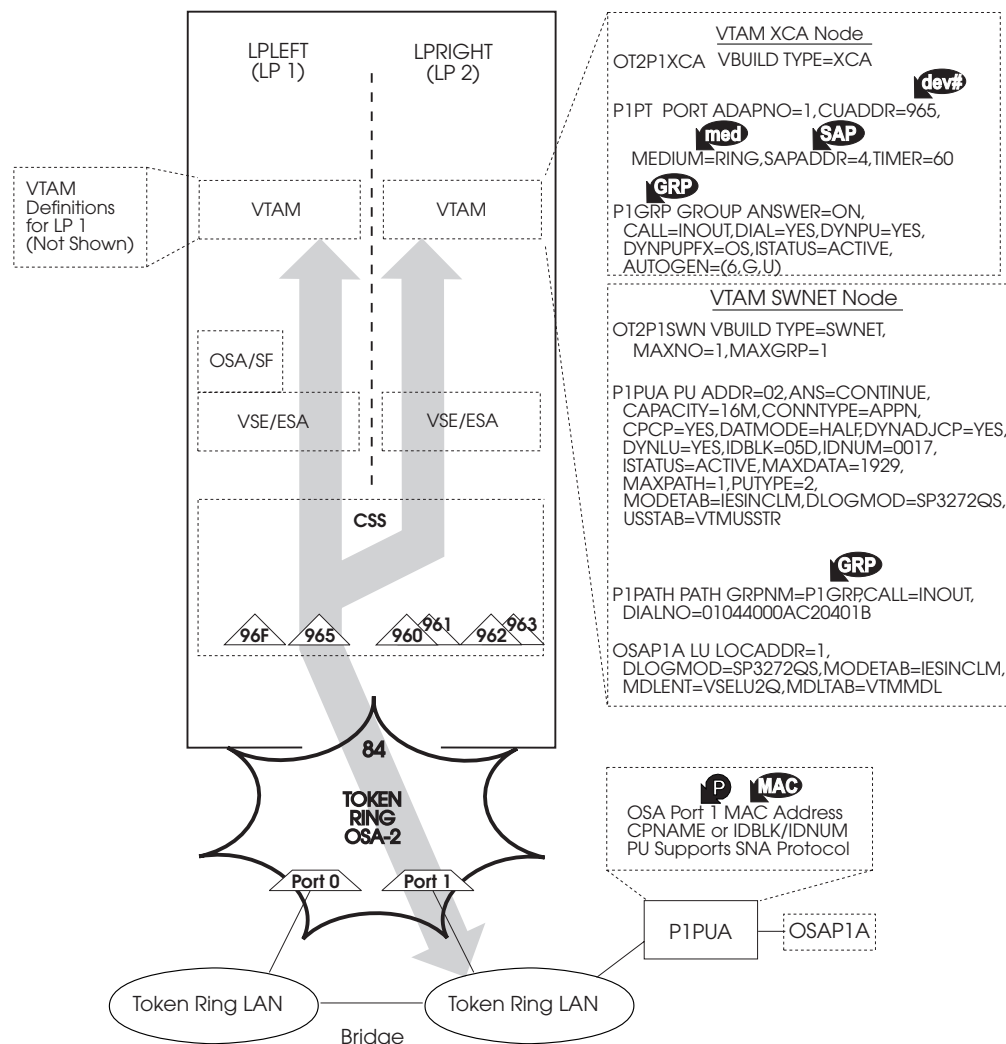


Figure 16. VTAM Macro Definitions

VTAM views an OSA as an external communication adapter (XCA). Therefore, you must define the OSA in the XCA major node. You must also define the switched connections in the switched network (SWNET) major node.

- The XCA and SWNET macro definitions for the example in this chapter are shown in the preceding figure. As you can see, VTAM in both LPs can access the token-ring LAN segment that is attached to port 1.
- System-independent discussions on these macros with different examples are provided on page 115.
- For more information on VSE/ESA requirements, see the VSE/ESA books listed in the bibliography (page xi).

## OSA-2 Definitions

For each OSA mode, you must create the appropriate OSA address table (OAT) entry or entries for the OSA channel path. For a discussion on the OAT, see page 5. After you have specified the proper input for the OAT entry or entries, you have created an OSA mode image that you must install and activate on the OSA.

In the following example, a token ring OSA-2, which is identified by OSA CHPID X'84', is defined to be shared between two logical partitions. VSE/ESA system images are running natively in LPAR mode in both logical partitions. TCP/IP in both LPs share access to ports 0 and 1. VTAM in both LPs share access to port 1.

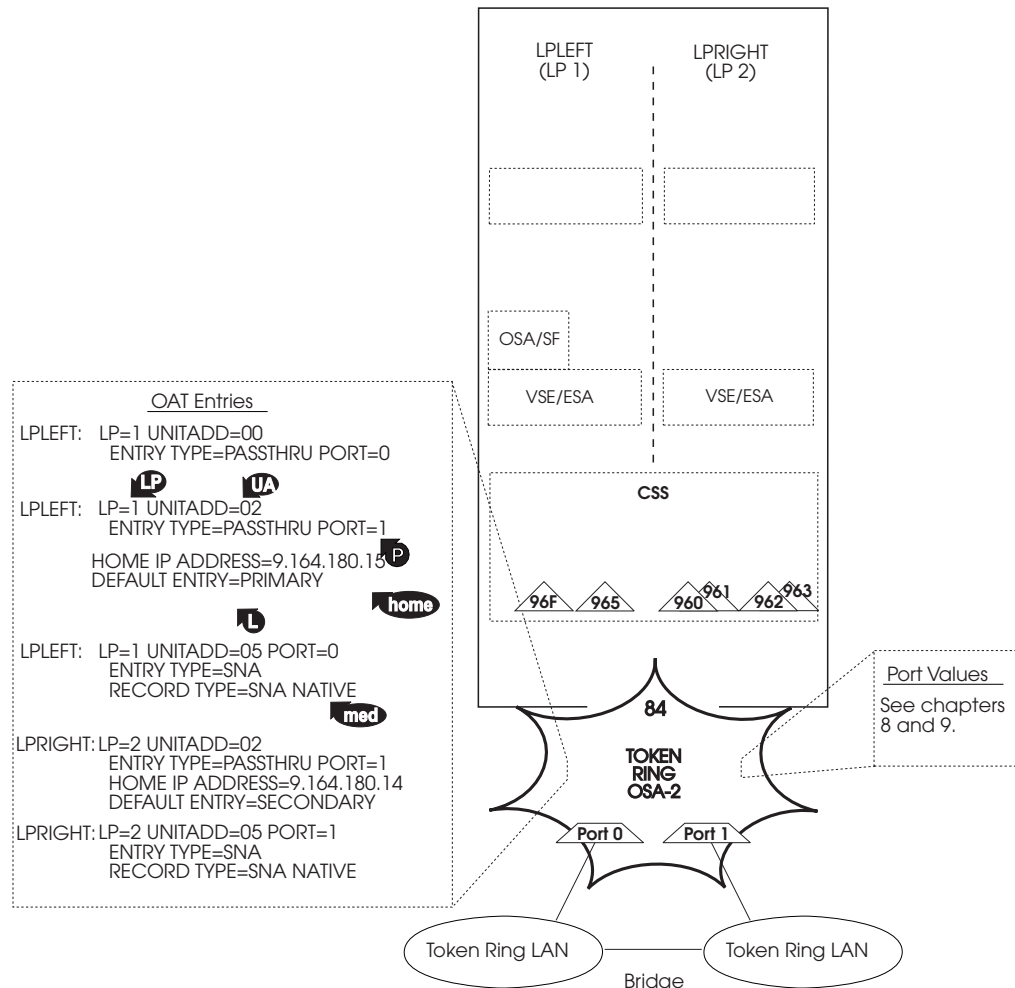


Figure 17. OSA-2 OAT Entry Definitions

In this example, the OSA channel path with OSA CHPID X'84' is defined to be shared between two logical partitions with VSE/ESA system images running in both logical partitions.

## Creating and Installing OAT Entries

**For any OSA that is supported in this environment except an ATM OSA-2,** you provide input for the OAT entries of an OSA mode configuration in one of the following ways.

- Provide input to the panels of the OSA/SF OS/2 interface (GUI) for each OSA mode.
- Run an IOACMD job to create the OAT entries you need to install the resulting OAT image on the OSA.

Note that you must get these jobs from the ICCF library (59) and put them in your private library. You will need to name the workfile to use for IOACMD's debug files. **PRD2.OSASF** is the recommended library.sublibrary.

**For more information, refer to:**

- Page 81 for the TCP/IP Passthru mode parameters.
- Page 104 for the SNA mode parameters.
- *VSE/ESA Central Functions Open Systems Adapter Facility User's Guide* which is listed in the bibliography (page viii).

## Activating an OAT Image

### Notes:

1. If OSA/SF for VSE/ESA is being used, refer to *VSE/ESA OSA/SF User's Guide*. Otherwise, refer to the appropriate OSA/SF user's guide. The titles and order numbers of these books are listed in the bibliography (page vii).
2. Installing an OSA mode image on an OSA is disruptive to all the devices using the OSA.
3. If you are creating an OAT image using the OSA/SF GUI, you can defer installation until a time that is more convenient by selecting Activate (No Install).
4. After you activate and install an OAT image, you must:
  - a. Vary the OSA devices for the affected CHPID offline from all the logical partitions to which the CHPID is defined.
  - b. Configure the CHPID off.
    - If the VSE/ESA system image is running natively, you must reconfigure the OSA CHPID from either the stand-alone support element or single object operations via the hardware management console.
    - If the VSE/ESA system image is running as a guest under VM/ESA, use the VM/ESA Vary command `VARY OFFLINE CHPID xx FORCE` ensuring that the OSA CHPID is varied off from all the logical partitions to which it is defined. (Alternatively, you can DET cua each OSA device from the VSE/ESA guest before varying the OSA CHPID offline.)
  - c. Configure the CHPID on.
    - If the VSE/ESA system image is running natively, you must reconfigure the OSA CHPID from either the stand-alone support element or single object operations via the hardware management console.
    - If the VSE/ESA system image is running as a guest under VM/ESA configure the OSA CHPID back online to all the logical partitions to which it is defined `VARY ONLINE CHPID xx`.
  - d. Vary the OSA devices back online to all the logical partitions to which the OSA is defined.

## OSA Port Definitions

- Each type of OSA port has several settable port parameters, which are described for that port in Chapter 9.
- Defining a locally-administrated MAC address for an OSA port is discussed on page 128.



---

## Chapter 6. OSA Modes for the IP Protocol

All OSAs support TCP/IP and the TCP/IP function of Communications Server when the OSA is being run in the TCP/IP Passthru mode. Furthermore:

- The FDDI OSA-2 supports the HPDT MPC mode to transfer IP data packets.

---

### IP Frame Protocols

The IP frame protocols that OSA supports are listed by OSA mode in the following sections.

#### TCP/IP Passthru Mode (All OSAs)

Any OSA-2 can be run in this mode in any of the environments that OSA supports. The OSA can be run concurrently in the TCP/IP Passthru and SNA modes if the requisites for both modes are met. A FDDI OSA-2 can also be run concurrently in the HPDT MPC mode.

In the TCP/IP Passthru mode, an OSA transfers data between a host IP program to which it is defined and clients on the following networks:

- A FDDI LAN that is attached to a FDDI OSA and supports the following frame protocol:
  - FDDI ANSI X3T9.5 using the 802.2 SNAP envelope
- A token-ring LAN that is attached to one of the ports on a token ring OSA-2 and supports the following frame protocol:
  - Token Ring 802.5 using the 802.2 envelope with SNAP

#### HPDT MPC Mode (FDDI OSA-2)

In the OS/390 or z/OS environment, a FDDI OSA-2 can be run in the HPDT MPC mode exclusively or concurrently with either the TCP/IP Passthru or SNA mode, or with both modes. In the HPDT MPC mode, this OSA supports the same Ethernet frame protocols that are listed above for the TCP/IP Passthru mode.

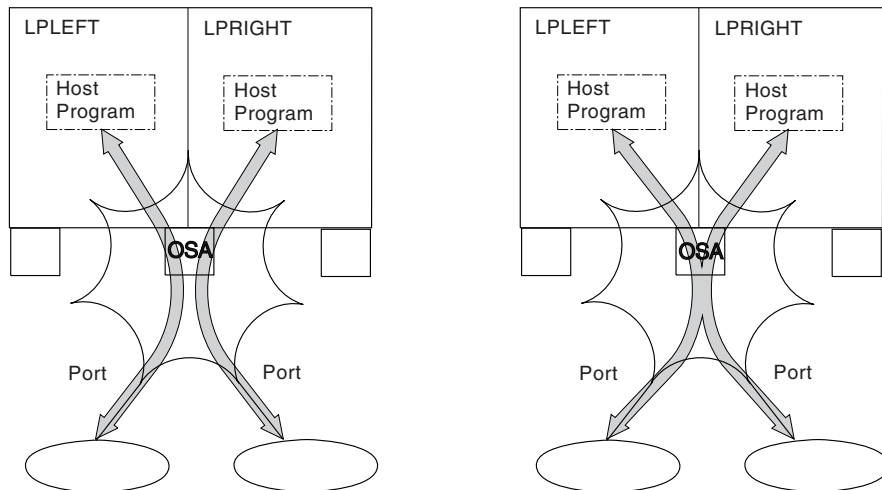
---

### OSA Port Sharing Among Logical Partitions

If a system is running in logically-partitioned (LPAR) mode with the EMIF facility, an OSA channel path can be defined to be shared among the logical partitions (LPs) to which it is defined in the system hardware I/O configuration (IOCDs). This allows access to a network port on the OSA to be shared among the system images that are running in the LPs to which the OSA has been defined.

The principle of *port sharing* is shown below. On the left, neither program shares access to either port. On the right, both IP programs share access to both OSA ports.





#### Notes:

1. Port sharing applies to all OSA modes, not just those described in this chapter. However, sharing access to an OSA port is especially noteworthy in the TCP/IP Passthru and HPDT MPC modes because an OSA can be run in both modes concurrently. In fact, an OSA can be run concurrently in the SNA mode as well.
2. Access to a port can be shared among the system images that are running in the logical partitions to which the OSA channel path is defined to be shared.
3. Access to a port can be shared concurrently among IP stacks in the same LP or in different LPs if the OSA is being run in the TCP/IP Passthru mode or HPDT MPC mode in any combination.
4. Access to a port can also be shared between one or more IP programs if the OSA is being run in the TCP/IP Passthru and/or HPDT MPC modes and VTAM when the OSA is being run concurrently in the SNA mode.

## Data Transfer of IP Packets

To transfer an IP packet across an OSA, two data paths must be defined: one inbound data path for IP packets whose destination is a Home IP address, and one outbound data path for IP packets whose destination is a network IP address. Each data path requires an entry in the OSA address table (OAT). To specify data paths for IP packets through an OSA, Passthru OAT entries are used in the TCP/IP Passthru modes and MPC entries are used in the HPDT MPC mode. Before proceeding to a discussion of these types of OAT entries, consider the following points.

**To send an inbound IP packet to a host program,** a LAN client first sends an ARP to determine which MAC address or addresses can be used for the connection to the Home IP address. If an OSA port's MAC address is selected for the IP packet, the OSA must know the Home IP address for which the inbound IP packet is destined. If that Home IP address is unknown to the OSA, the OSA must also know what to do with the inbound IP packet.

**To send an outbound IP packet to a network client,** the TCP/IP program or TCP/IP function of Communications Server must not only specify the destination address in its Gateway statement, but also direct it to the proper OSA using the defined read/write device pair. Additional data items may be needed depending on

the OSA mode, whether access to the OSA port is being shared between logical partitions, whether the data path is being shared between IP stacks, and so on.

**OSA supports IP unicast and IP broadcast destination addresses** in all the modes in which IP data packets are transferred.

**OSA supports IP multicast destination addresses** only in the TCP/IP Passthru mode and only in a Communications Server environment. If the PTF resolution to OSA/SF APAR OW33393 is applied, OSA/SF presents the IP multicast addresses of the registered members of the multicast group for the OSA. Examples of the OSA/SF GUI panels are listed for each OSA in Chapter 9.

For more information, see the IP Configuration books listed in “Communication Server for z/OS” on page ix and “Communication Server for OS/390” on page x.

## Passthru OAT Entries

A Passthru OAT entry is used in the TCP/IP Passthru mode. Its key parameters are the unit address (UA), the LP number of the logical partition involved, the host Home IP address of each IP stack involved, and the optional designation of primary and secondary default data paths.

### Unit Address (UA)

TCP/IP and the TCP/IP function of Communications Server view an OSA that is being run in the TCP/IP Passthru mode as a LAN channel station (LCS) device. Because IP is a duplex protocol, it requires separate read/write (even/odd) devices, which you define in the system hardware I/O configuration (page 20). The read device number and, therefore, the even unit address, are associated with the inbound data path.

Using OSA/SF, you can add, change, or delete, an inbound data path Passthru OAT entry. (OSA/SF automatically takes a corresponding action on the matching outbound data path entry.) In the OSA/SF GUI panels, the even unit address of the Passthru entry is displayed on the top data line between the logical partition (LP) number and the port number.

### LP Number

Each OAT entry correlates the port number, the unit address of a device, and the number of the logical partition (LP) of the system image on which the host program is running if the system is running in LPAR mode. If the OSA channel path is defined in the system hardware I/O configuration as shared among logical partitions, OSA/SF needs user input to determine the LP number. Otherwise, use LP=0.

### Default Inbound Data Paths

If an OSA is defined to be shared in the TCP/IP Passthru mode, you can define a default inbound data path in one of the Passthru OAT entries that you define. A default data path is the path that the OSA uses to forward an inbound packet that has an unknown destination IP address, that is, a z900 Home IP address, that is unknown to the OSA in the active mode.

If the PTF resolutions to the OSA/SF APARs listed in the next paragraph are not applied, you can define only one inbound data path, which was called the *default LP*, in one of the Passthru entries for the active mode. The other Passthru entries in the mode were not default data paths. This nomenclature is still used in a basic Passthru entry (page 83), and it equates with the *primary default entry* that is used in the expanded Passthru entry.

If the PTF to one of the following OSA/SF APARs is applied, you can designate up to two Passthru entries in the same mode to specify default inbound data paths. These OSA/SF APARs are OW33393 (OS/390 and MVS/ESA), OW33394 (VM/ESA) and PQ16071 (VSE/ESA). You designate primary default entry, *secondary default entry*, or neither primary nor secondary default entry, for each Passthru entry. The OSA forwards an inbound IP packet with an unknown destination IP address (Home IP address) across the primary default data path if it is available. It forwards the IP packet across the secondary default path only if the primary path is not available but the secondary path is.

The concept of primary and secondary inbound default data paths is shown in the figure on page 91. If the default data path is changed from primary to secondary, or vice versa, OSA/SF issues an IOA message.

Do not confuse a default inbound data path with the default OAT. (A default OAT is one whose entries have not been customized by OSA/SF as described on page 5.)

### Home IP Address

If an inbound IP packet that is received by an OSA port can be sent to only one IP stack, the OSA does not need user input on the Home IP address. However, if the OSA is required to send IP packets to more than one IP stack or if the OSA is being run in more than one mode concurrently, the situation is different. In those cases, you must either have specified the proper Home IP address in an inbound OAT entry, or the OSA must have a default inbound data path available to it.

If the required OSA/SF PTF is applied (page 81) so that the expanded Passthru entry is used, you can enter up to 8 Home IP addresses in the same inbound Passthru OAT entry as long as you do not exceed the maximum of 16 Home IP addresses for the port concurrently. These multiple Home IP addresses therefore allow redundant pathing for IP packets that are inbound from the LAN to the host as shown in the next set of figures.

If the required PTF is not applied, only the basic Passthru entry is available (page 83). In the basic Passthru entry, you can specify only 0 or 1 Home IP address so that redundant inbound pathing is not feasible in the same OAT entry. Remember, you must specify 1 Home IP address if access to the port is shared among the logical partitions to which the OSA is defined in the mode, the OSA is being run concurrently in more than one mode, or you want to designate a default inbound data path.

## MPC OAT Entries for IP Traffic

MPC OAT entries are needed for the HPDT MPC mode.

- In the HPDT MPC mode, IP data packets can be transferred across a FDDI OSA-2 (page 93).

---

## TCP/IP Passthru Mode

As the name TCP/IP Passthru mode implies, an OSA works as a passthrough agent for TCP/IP on its z900 platform. TCP/IP views the OSA as a LAN channel station (LCS) device.

**Note:** The discussion in this chapter applies to the OSA TCP/IP Passthru mode in general. However, the examples and some of the information assumes that TCP/IP for z/OS, OS/390, VSE/ESA, or VM/ESA is being used.

## Task Planning Checklist

- \_\_\_ 1. It is advisable to prepare worksheets for each OSA to keep track of all the data items.
- \_\_\_ 2. Ensure that the programming requisites for this mode are met. See the z900 system requisites in the earlier chapters of this book. Also, refer to the IP books listed in the bibliography (page ix).
- \_\_\_ 3. Ensure that the installation factors relevant to this mode are taken into account. Refer to the chapter on the relevant operating system.
- \_\_\_ 4. Enter the Home IP address(es) of each z900 IP program with a data path through the OSA that is operating in TCP/IP Passthru mode if any of the following applies:
  - HPDT MPC and/or SNA are running concurrently with TCP/IP
  - Multiple TCP/IP stacks are defined on one LP
  - The OSA has a port shared by 2 or more LPs
- \_\_\_ 5. Plan for the use of this mode, including how to handle problems that can occur. When using OSA/SF, refer to the OSA/SF user's guide that is listed in the bibliography (page vii).

## TCP/IP Passthru Mode Tasks

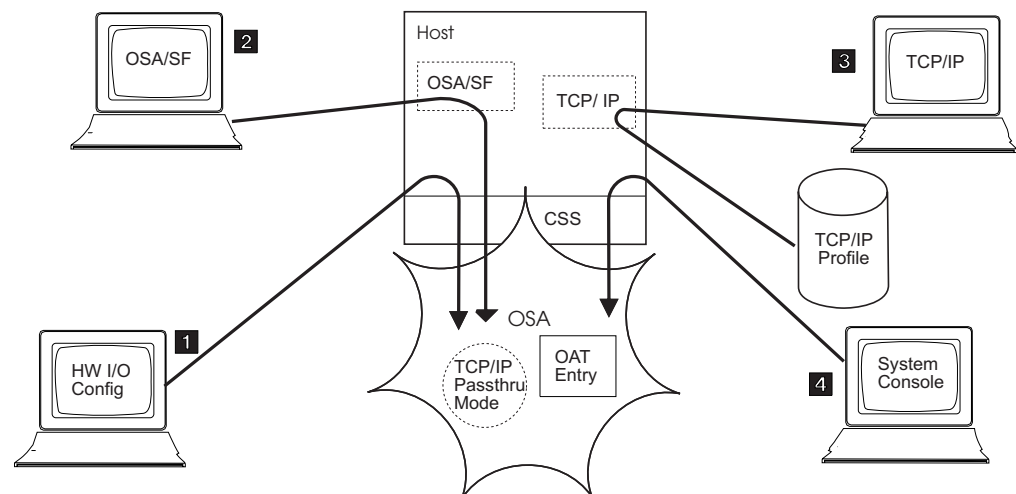


Figure 18. Configuring TCP/IP Passthru Mode

- 1** For each port to be used in this mode, associate one even/odd, read/write pair of logical device numbers with the channel path in each LP involved. Remember the unit address that you associate with each device number because you will need to input it to OSA/SF for an inbound Passthru OAT entry. Remember also that IBM-supplied default unit addresses are provided in the default OAT table for each OSA except an ATM OSA-2.
- 2** To deploy any OSA in this mode fully, for example, for port sharing, multiple Home IP addresses, and default inbound data paths, you will need the services of OSA/SF to input data for the OAT entries.
- 3** Identify each OSA to TCP/IP or the TCP/IP function of Communications Server as a LAN channel station (LCS) device. Associate the LCS address, which is the even-numbered (read) device, with the IP device name, link name, port number, and frame protocol.

**4** To activate an OSA mode, the OSA channel and its associated device numbers must be configured off from all the partitions in which the OSA is defined, and then configured back on. (The OSA CHPID must be reset.)

## System Hardware I/O Configuration (IOCDs) Definitions

### General Notes

TCP/IP and the TCP/IP function of Communications Server view an OSA that is being run in the TCP/IP Passthru mode as a LAN channel station (LCS) device. IP duplex protocol requires that you associate one read/write, even/odd device pair in this mode. If the system is running in logically-partitioned (LPAR) mode and the OSA channel path is defined to be shared, these device pairs can also be shared among the logical partitions (LPs) to which the OSA is defined in this mode

- As applicable, check your Communications Server library ("Communication Server for z/OS" on page ix and "Communication Server for OS/390" on page x) or the other applicable IP books (page xi) for constraints imposed by the host program. For example, your level of TCP/IP may not support 4-digit device numbers or might require an OSA device to be specified as static, that is, DYNAMIC=NO.
- If access to the OSA port is not shared, consider defining only one partition to the port for the TCP/IP Passthru mode. If you define more than one LP, the TCP/IP that establishes its interface with the OSA for that port first becomes the "owner" of that port.
- Specify consecutive unit addresses, each of which is associated with one of the even/odd read/write pair of device numbers. Specify a unit address value from X'00' through X'FB'.
- It is strongly recommended that you associate the IBM-supplied default unit address numbers with the device numbers. If the OSA is not to be managed by OSA/SF, you must, in fact, do so.
- Specify the same unit address to OSA/SF for the OSA OAT entry that you specify for that device and LP in the hardware I/O configuration. The order in which you do so does not matter, but the communication path cannot be active until both specifications have been successfully completed.
- If an OSA is being managed by OSA/SF that is running on a system image in a system in a logically-partitioned (LPAR) mode and if you have defined access to a port to be shared, create an OAT entry for each TCP/IP that has access to the port. Also, omit the LP names in the IODEVICE statements.

### Device and Unit Address Definitions

- For each LP in a system running in LPAR mode or for the system running in basic mode, specify one even/odd, read/write pair (2 consecutive numbers) for each OSA LAN port to be used in this mode.
- Associate a unit address with each device number.  
The IBM-supplied default unit addresses are X'00' and X'01' for port 0 and X'02' and X'03' for port 1.
- If you use IOCP to define the device numbers for the examples at the end of this section, you would input:

    
IODEVICE ADDRESS=(8000,4),CUNUMBR=100,UNIT=OSA,UNITADD=00

## OSA Definitions (Passthru OAT Entries)

A Passthru OAT entry specifies a data path through the OSA when it is being run in the TCP/IP Passthru mode. If an OSA is being run in the modes that require a Passthru entry, a pair of entries is required, but you create only the inbound Passthru entry for the even (read) device number. OSA/SF automatically creates the matching outbound for the odd (write) Passthru entry. To create a Passthru entry, you can use either the OSA/SF GUI or REXX interface. In the following discussion, it is assumed that you are using OSA/SF GUI.

Check whether you must create an inbound Passthru OAT entry or whether the default OAT entries will be used in this OSA. Refer to page 5 for a discussion of the OAT, and note that an OSA's default OAT can be used only if the following conditions are met.

- The default set of unit addresses has been associated in the system hardware I/O configuration with the pair of device numbers that is associated with the OSA channel path when the OSA will be run in this mode.
- The OSA will not be run concurrently in any other mode so that you do not have to define a Home IP address in the Passthru OAT entry.
- If the system is running in LPAR mode, access to the OSA port will not be shared among the logical partitions (LPs) to which the OSA is defined in the system hardware I/O configuration for the TCP/IP Passthru mode.

### Expanded Passthru OAT Entry

If the PTF resolution to one of the following OSA/SF APARs is applied to the system, the expanded Passthru OAT entry is used. OW33393 is required in an OS/390 environment; OW33394 in a VM/ESA environment; and PQ16071 in a VSE/ESA environment. The advantage of the expanded Passthru OAT entry lies in the fact that you can specify up to eight (8) Home IP addresses in the same inbound Passthru entry. You can also specify a primary default data path in one inbound Passthru entry and a secondary default data path in another inbound Passthru entry.

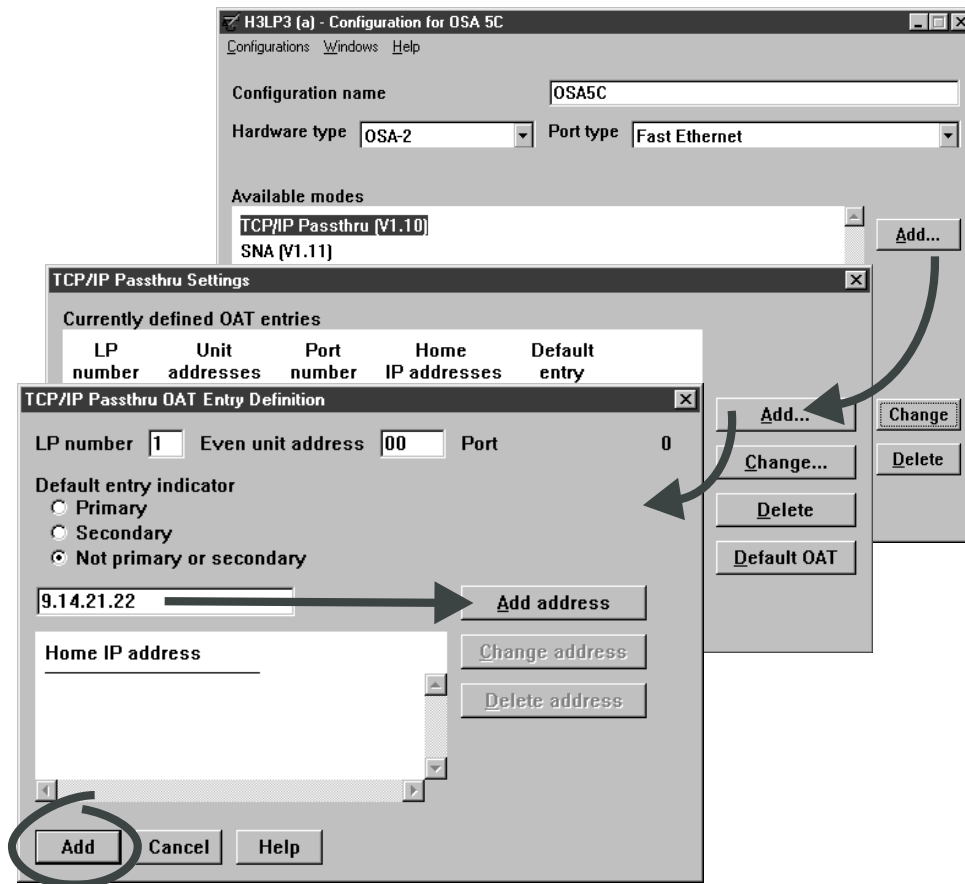


Figure 19. Defining an Expanded Passthru OAT Entry

In the preceding figure for a token ring OSA-2, the three OSA/SF panels are shown that you need to use to add, change, or delete a Passthru entry. Those buttons are partially hidden by the large arrow at the right of the middle panel. Note, however, that there is also a *Default OAT* button on the right of the **TCP/IP Passthru Settings Panel**.

**Note:** The *Default OAT* button allows you to reset the OSA to its default OAT settings, which OSA/SF then displays. Those settings require the IBM-supplied default unit addresses and do not allow the OSA port to be shared. See page 17.



#### LP #

If the OSA is defined to be shared among LPs, specify the LP number of LP for this data path. If the OSA channel path is not defined to be shared, enter 0.



#### Even unit address:

Specify the unit address that is associated with the lower, even-numbered device number that you specified in the system hardware I/O configuration (IOCDS) for this OSA data path (logical connection).





### **Port**

Specify the port number (0 for a FDDI OSA-2; 0 or 1 for an token ring port) of the port used in this data path.



### **Default entry indicator**

- Specify primary if you want the OSA to send an IP packet with an unknown inbound address across this data path if it is available.
- Specify secondary if you want the OSA to send an IP packet with an unknown inbound address across this data path if it is available and the primary default inbound data path is not available. (Make sure that another inbound Passthru OAT entry specifies the primary default data path.)
- Accept or specify the default, which is not primary or secondary, if you do not want the OSA to forward any inbound IP packet with a Home IP address unknown to the OSA in this mode.



### **Home IP address**

Specify from one up to eight Home IP addresses or leave the field blank.

- If you specify at least one Home IP addresses for this inbound OAT entry, remember that you cannot specify more than 16 Home IP addresses for the port at one time. (A port can be used concurrently in the TCP/IP Passthru, HPDT MPC, and SNA modes.)
- If you leave this field blank, the data path specified by this OAT entry cannot be used as a default inbound data path.

## **A Basic Passthru OAT Entry**

If the PTF resolution to none of the following OSA/SF APARs has been applied, you can create only a basic Passthru OAT entry: OSA/SF APAR OW33393 in an OS/390 environment, OW33394 in a VM/ESA environment, and PQ16071 in a VSE/ESA environment.

**TCP/IP Passthru OAT Entry Definition**

LP number  Even unit address  Port

Default entry indicator

☐ Primary

☐ Secondary

☒ Not primary or secondary

**Home IP address**

Figure 20. Defining a Basic Passthru OAT Entry



#### **LP #**

If the OSA is defined to be shared, specify the LP number with which you want to associate the data path specified by this OAT entry. If the OSA is not defined to be shared, enter 0.



#### **Even unit address**

Specify the unit address of the lower, even-numbered device number that you specified in the system hardware I/O configuration (IOCDS) for this data path in this mode.



#### **Port**

Specify the port number (0 for a FDDI; 0 or 1 for a token ring port).



#### **Home IP address**

If the device pair used in this mode for the OSA is defined in the system hardware I/O configuration as shared and you want more than one IP stack to have access to this OSA port concurrently or you specify that the OSA can be run concurrently in another mode, specify the Home IP address of the IP stack of the LP that is specified in this Passthru OAT entry.



#### **Default LP**

You can override the default (Not primary or secondary) to specify this Passthru entry as the primary, or only, inbound default data path to be used

in this mode. The OSA will send each IP data packet with an unknown address across the data path specified by this OAT entry.

You can also specify this as the secondary default data path to be used should the primary be unavailable.

If you are adding more than one entry, select **Add** after each entry and then type over the previous information. When you are done adding entries, select **Cancel**.

**Note:** The term default LP is used only on input. On output, the term default entry is used. For a comparison of these two terms, see page 77.

## TCP/IP Definitions

In the examples in this book, only the most simple formats of the TCP/IP profile statements are used. The following discussion is meant to put OSA-related parameters into the context of the host server program, but it is beyond the scope of this book to describe TCP/IP statements fully. For more information, refer to the TCP/IP books and Communications Server libraries listed in the bibliography (pages ix and x).

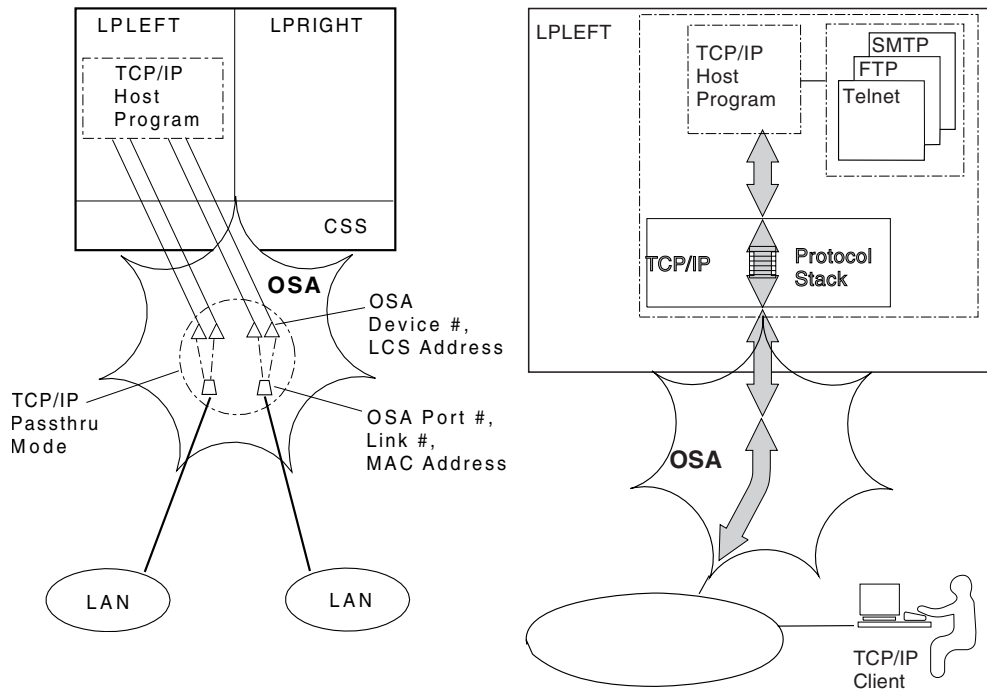
### Requirements

An OSA being run in the TCP/IP Passthru mode is viewed as a LAN channel station (LCS) device by the z900 TCP/IP and the TCP/IP function of Communications Server, which use the device pair required by the IP duplex protocol to establish the data path to the OSA port. You must therefore define the read, or lower, or even-numbered device number in the IP program's Device statement as the LCS address. And, you must define the OSA port number as the link number in the corresponding Link statement.

These definitions are shown in the following figures, which use the TCP/IP as an example. A triangle depicts the device number. A trapezoid depicts the port number. Traffic paths are simplified to avoid cluttering the figure. Two logical partitions (LPs) are shown: LPLEFT and LPRIGHT.

### Notes:

1. A MAC address is shown for the port. A MAC address is significant in the TCP/IP Passthru and HPDT MPC modes to identify the port on a directly-attached LAN.
2. You must also specify the Home IP address of the LP associated with an inbound Passthru OAT entry if access to the OSA port is to be shared. If you are creating an expanded Passthru OAT entry (page 81), you can specify more than one Home IP address to provide redundant pathing.



### For the Device Statement

Note that the LCS address is the even-numbered device number that you want to associate with the port number. Also note that the NETMAN parameter is not supported for OSA. Following the format:

```

DEV
DEVICE device_name LCS lcs_address
dev#

```

For LPLEFT (LP 1), one statement is needed for port 0 and one for port 1.

```

DEV
DEVICE OSATR0 LCS 1800
dev#
DEVICE OSATR1 LCS 1802

```

For LPRIGHT (LP 2), one statement is needed for port 1.

```

DEVICE OSATR1 LCS 1802

```

### For the Link Statement

Note that the TCP/IP link number is the same as the OSA port number.

```

link
LINK link_name network_protocol link_number device_name
E P DEV

```



For LPLEFT, one statement is needed for port 0 and one for port 1.

     
 LINK TR0 IBMTR 0 OSATR0  
 LINK TR1 IBMTR 1 OSATR1

For LPRIGHT, one statement is needed for port 1.

     
 LINK TR1 IBMTR 1 OSATR1

## For the Home Statement

   
 HOME home\_ip\_address link\_name

For LPLEFT (LP 1), two statements are needed:

   
 HOME 128.40.200.191 TR0  
 HOME 128.40.202.192 TR1

For LPRIGHT (LP 2), one statement is needed:

   
 HOME 128.40.202.182 TR1



## For the Gateway Statement

### Notes:



1. If there is a hop, associate it with the network address and the link name.
2. In these examples, there is no hop so '=' is used to specify that the data is routed directly to destinations on that network.
3. The most specific form of the network address, the client IP address, is used in these examples.

   
 GATEWAY network first hop link\_name max\_packet\_size subnet\_mask

For LPLEFT, two statements are needed:

   
 GATEWAY 128.40.200.58 = TR0 DEFAULTSIZE 0  
 GATEWAY 128.40.202.68 = TR1 DEFAULTSIZE 0

For LPRIGHT, one statement is needed:

   
 GATEWAY 128.40.202.68 = TR1 DEFAULTSIZE 0

## For the Start Statement



START device\_name

For LPLEFT: START OSATR0 and START OSATR1

For LPRIGHT: START PSATR1

## Example 1. Sharing Access to a CHPID

Assume that the 2 ports of token ring OSA-2 X'80' have been attached to different token-ring LANs. Because the channel path is defined to be shared, TCP/IP in both LP 1 (LPLEFT) and LP 2 (LPRIGHT) can access the CHPID. (In examples 1, 2, and 3, basic Passthru OAT entries are used.)

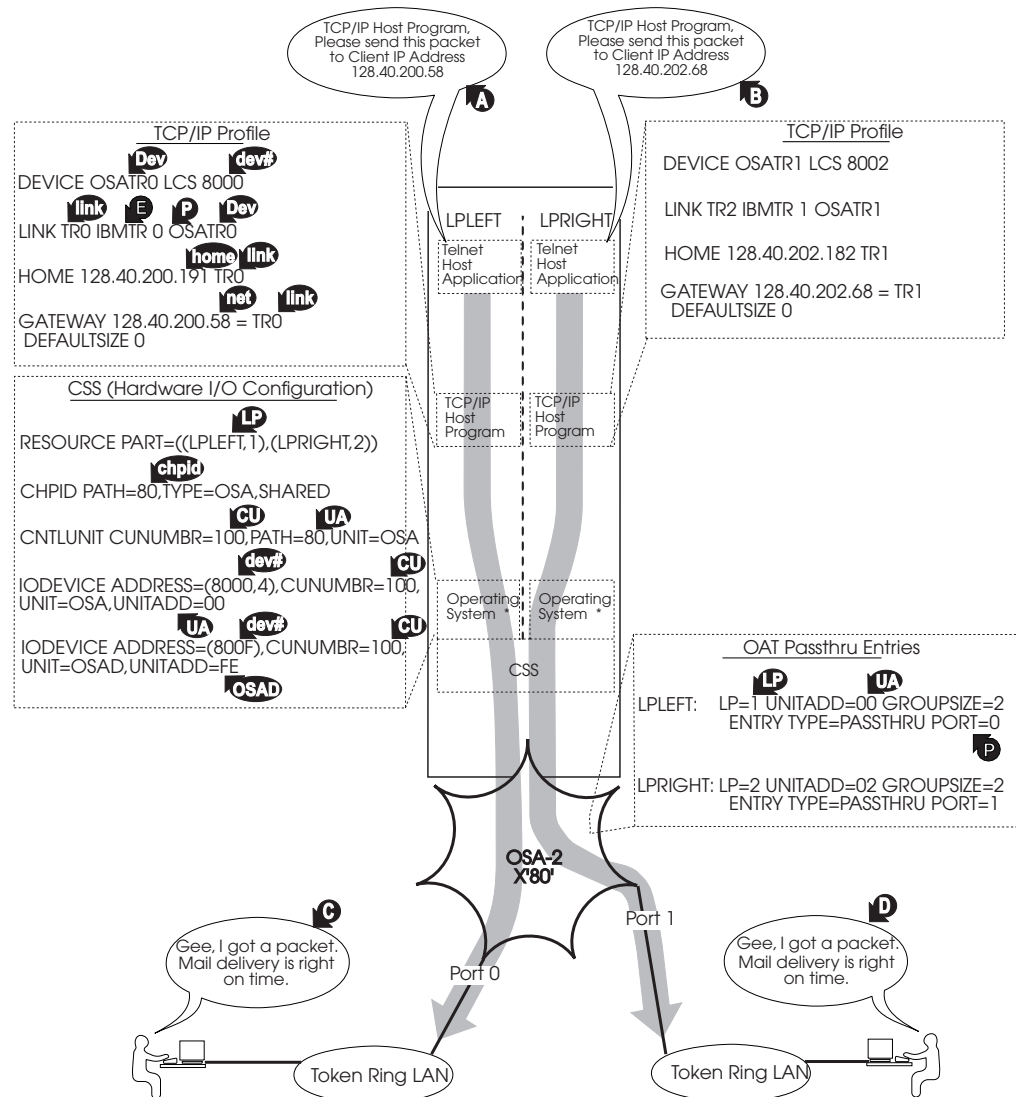


Figure 21. Example 1. Sharing Access to a CHPID

## Example 2. Sharing Access to an OSA Port

Once you define the Home IP address in the appropriate OAT entries, TCP/IP in LP 1 (LPLEFT) can share access to port 1 with TCP/IP in LP 2 (LPRIGHT), allowing both TCP/IPs to send packets to a client on the LAN attached to port 1. (in examples 1, 2, and 3, basic Passthru OAT entries are used.)



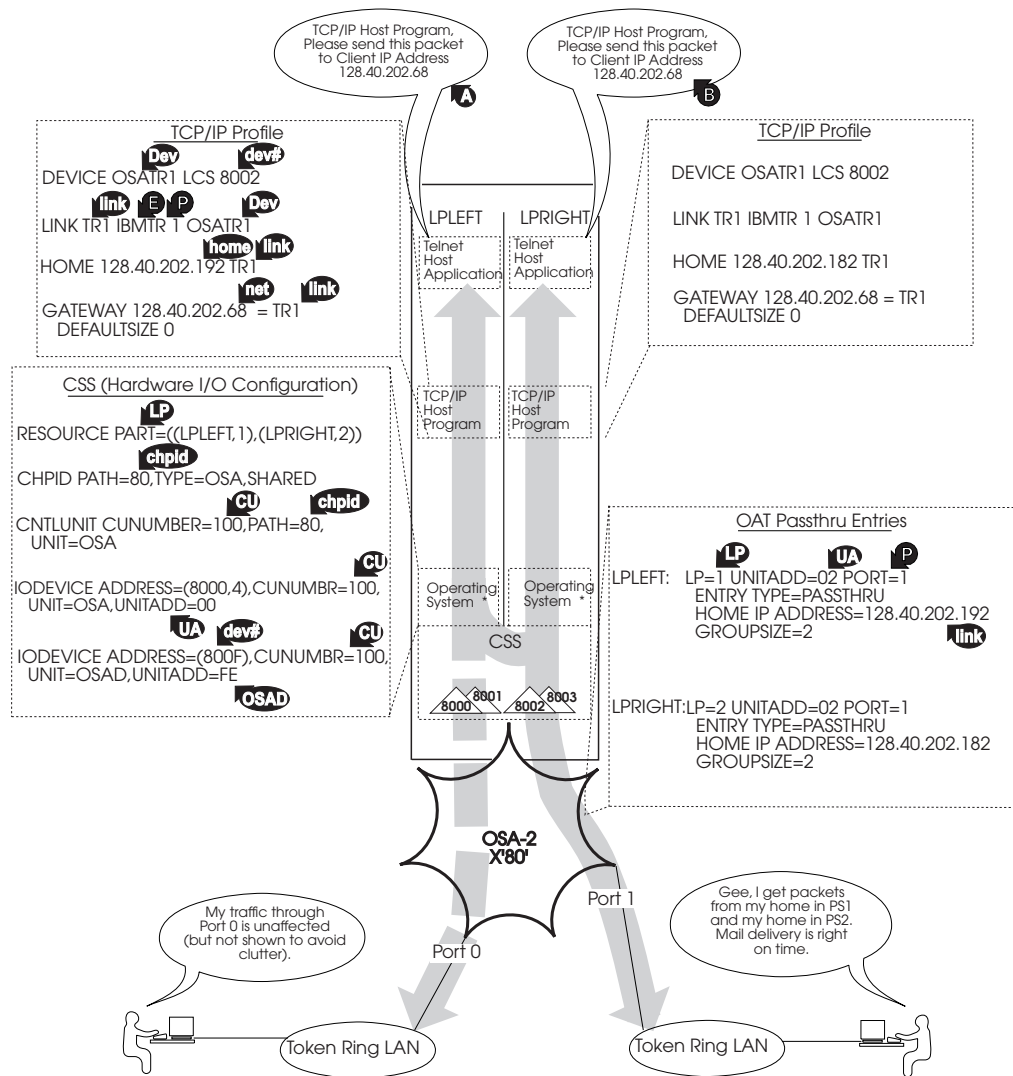


Figure 22. Example 2. Sharing Access to an OSA Port

### Example 3. Specifying a Default Inbound Data Path

In this example, basic Passthru OAT entries are used. Therefore, only a primary default inbound data path can be specified. For the specifications on the expanded Passthru OAT entries, refer to page 81.

For an example of primary and secondary default entry designations, see Example 4 on the next page.

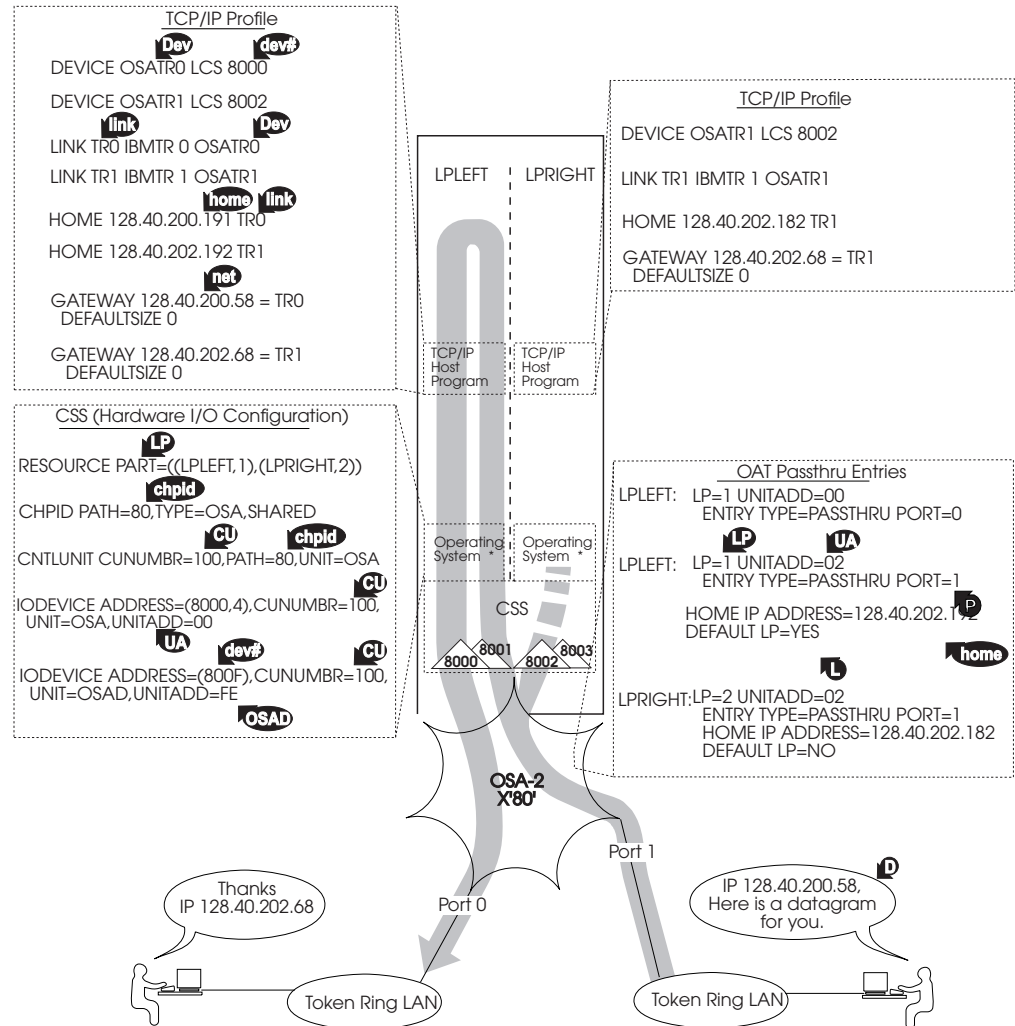


Figure 23. Example 3. Specifying a Default Inbound Data Path

## Example 4. Expanded Passthru OAT Entries

If the expanded Passthru OAT entry is used to define the inbound data paths (pages 77 and 81), you can define more than one Home IP address for a given data path. Furthermore, you can designate a data path to be a primary inbound default path, secondary inbound default path, or neither a primary nor a secondary default path.

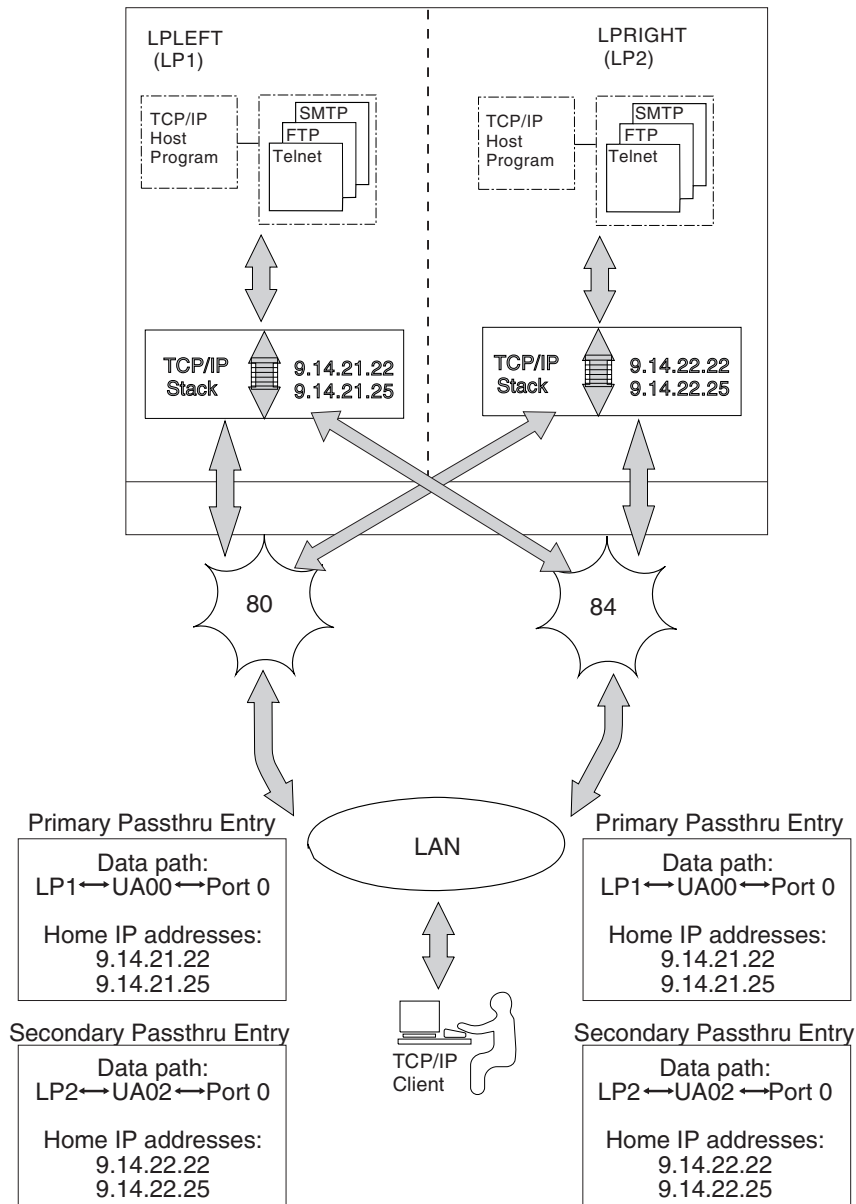


Figure 24. Example 4. Expanded Passthru OAT Entries

In Figure 24, TCP/IP in LP 1 (LPLEFT) has two Home IP addresses that the LAN client can use: 9.14.21.22 and 9.14.21.25. You have specified both Home IP addresses in a Passthru OAT entry. You also created two Passthru OAT entries. One entry describes the primary default data path for inbound IP packets that have addresses unknown to the OSA. The other Passthru entry describes the secondary default data path for those packets. These Passthru OAT entries are therefore called the primary default entry and the secondary default entry, respectively.

The LAN client can now send an IP packet for either Home IP address through either OSA port. Neither OSA is therefore a single point of failure. If both ports are available, they both respond to the LAN client's ARP. If an inbound IP packet is sent through a default data path, which is represented by a default Passthru entry, switching may or may not be required between the two logical partitions before the packet arrives at its correct destination. For information on switching between logical partitions, refer to the IP and programming system books.

In addition, remember to take the following steps.

- Define a device pair for each Home IP address in the hardware I/O configuration (IOCDS). See page 80.
- Define the OSA for each device pair in the TCP/IP through the Device, Link, Home, and Gateway statements as discussed on page 85.

---

## HPDT MPC Mode

A FDDI OSA-2 can be customized to be run in the High Performance Data Transfer Multipath Channel (HPDT MPC) mode in a z/OS or OS/390 environment. A FDDI OSA-2 supports only the IP protocol, which is described in this section.

In the HPDT MPC mode, a FDDI OSA-2 supports High Speed Access Services (HSAS). Because a discussion of HSAS falls outside the scope of this book, refer to the OS/390 or z/OS books listed in the bibliography for more information on HSAS.

## Task Planning Checklist

1. Ensure the requirements for the HPDT MPC mode are met that are listed on page 32.
2. In the system hardware I/O configuration (IOCDS), associate one even/odd, read/write pair of device numbers with the OSA channel path and its associated control unit if the OSA is defined to be shared across logical partitions and you want to use the same pair of device numbers. Otherwise, define one pair of device numbers for each data path that you want in this mode.  
  
An example of HCD definitions is provided in the next section. A discussion on IOCDS starts on page 17. For more information on IOCDS parameters, refer to the appropriate system books, some of which are listed in the bibliography (page ix).
3. Ensure that OSA/SF is running on z/OS or OS/390 and can customize the FDDI OSA-2 in the HPDT MPC mode.
4. Using OSA/SF, define an MPC OAT configuration for the OSA channel paths (CHPIDs) to be run in this mode. An example of an MPC OAT entry for this mode is shown on page 97.
5. Activate the HPDT MPC mode on the OSA-2 as described in *OS/390 OSA/SF User's Guide*, which is listed in the bibliography (page vii).
6. Create a VTAM resource definition for the OSA by defining the OSA name, port name, and the pair of device numbers in the TRLE statement of the VTAM or Communications Server SNA TRL macro. An example is provided on page 99. For more information, refer to the appropriate system books listed in the bibliography (pages ix and x).
7. Activate the VTAM resource definition that you created.
8. Assign a Home IP address to the device pair. Use the OS/390 UNIX System Services OEIFCONFIG commands to define and start the LAN connection (data path). See "An Example" on page 99. For more information, refer to the system books some of which are listed in the bibliography (page ix).

## HCD Definitions

Assuming that you use the HCD panels to define the OSA in the system hardware I/O configuration data set (IOCDS) that is shown on page 99, the following HCD panels would be used to define FDDI OSA-2 CHPID X'C8' with control unit X'C800' and the read/write device pair X'C806' and X'C807' to be used in the HPDT MPC

mode. Note that not all the transition HCD panels are shown, nor the panel that specifies attachment to the z900 system.

GotoFilterBackupQueryHelp

Add Channel Path

Specify or revise the following values.

Processor ID . . . . . : OS390S1

Configuration mode : LPAR

Channel path ID . . . . . : C8 +

Number of CHPIDs . . . . . : 1

Channel path type . . . . . : OSA +

Operation mode . . . . . : SHR +

Description . . . . . : \_\_\_\_\_

Specify the following values only if connected to a switch:

Dynamic switch ID . . . . . : \_\_ + (00 - FF)

Entry switch ID . . . . . : \_\_ +

Entry port . . . . . : \_\_ +

F1=Help F2=Split F4=Prompt F5=Reset F9=Swap F12=Cancel

Figure 25. Add Channel Path

GotoFilterBackupQueryHelp

Define Access List

Row 1 of 10

Command ==> \_\_\_\_\_ Scroll ==> PAGE

Select one or more partitions for inclusion in the access list.

Channel path ID . . . . : C8

Channel path type . . . : OSA

Operation mode . . . . : SHR

Number of CHPIDs. . . : 1

| / Partition Name | Number | Usage | Description                |
|------------------|--------|-------|----------------------------|
| / LPLEFT         | 1      | OS    | Used for HPDT MPC OSA path |
| / LPRIGHT        | 2      | OS    |                            |

F1=Help F2=Split F4=Prompt F5=Reset F9=Swap F12=Cancel

Figure 26. Define Access List

|                                                                                                          |                 |                                |         |      |
|----------------------------------------------------------------------------------------------------------|-----------------|--------------------------------|---------|------|
| Goto                                                                                                     | Filter          | Backup                         | Query   | Help |
| Add Control Unit                                                                                         |                 |                                |         |      |
| Specify or revise the following values                                                                   |                 |                                |         |      |
| Control unit number                                                                                      | . . . . .       | C800                           |         |      |
| Control unit type                                                                                        | . . . . .       | OSA                            | _____ + |      |
| Serial number                                                                                            | . . . . .       | _____ +                        |         |      |
| Description                                                                                              |                 | HPDT/OSA connection to OS390S1 |         |      |
| Connected to switches                                                                                    | . . . _ _ _ _ _ | _____ +                        |         |      |
| Ports                                                                                                    | . . . . .       | _____ +                        |         |      |
| If connected to a switch, select whether to have CHPIDs/link addresses, and unit address range proposed. |                 |                                |         |      |
| Auto-assign                                                                                              | . . . . .       | 2                              | 1. Yes  |      |
|                                                                                                          |                 |                                | 2. No   |      |
| F1=Help F2=Split F4=Prompt F5=Reset F9=Swap F12=Cancel                                                   |                 |                                |         |      |

Figure 27. Add Control Unit (1)

|                                                        |           |         |                   |      |
|--------------------------------------------------------|-----------|---------|-------------------|------|
| Goto                                                   | Filter    | Backup  | Query             | Help |
| Add Control Unit                                       |           |         |                   |      |
| Specify or revise the following values                 |           |         |                   |      |
| Control unit number                                    | . . . . . | C800    | Type . . . . .    | OSA  |
| Processor ID                                           | . . . . . | OS390S1 |                   |      |
| Channel path IDs                                       | . . . . . | C8      | _____ +           |      |
| Link address                                           | . . . . . | _____ + |                   |      |
| Unit address                                           | . . . . . | 06      | _____ +           |      |
| Number of units                                        | . . . . . | 255     | _____             |      |
| Logical address                                        | . . . . . | 1       | + (same as CUADD) |      |
| Protocol                                               | . . . . . | _____ + | (D,S or S4)       |      |
| I/O concurrency level                                  | . . . . . | _____ + | (1, 2 or 3)       |      |
| F1=Help F2=Split F4=Prompt F5=Reset F9=Swap F12=Cancel |           |         |                   |      |

Figure 28. Add Control Unit (2)

|                                                        |                                                                              |                           |       |      |
|--------------------------------------------------------|------------------------------------------------------------------------------|---------------------------|-------|------|
| Goto                                                   | Filter                                                                       | Backup                    | Query | Help |
| Define Device / Processor                              |                                                                              |                           |       |      |
| Specify or revise the following values                 |                                                                              |                           |       |      |
| Device number . . . :                                  | C806                                                                         | Number of devices . . . : | 2     |      |
| Device type . . . . :                                  | OSA                                                                          |                           |       |      |
| Processor ID . . . . :                                 | OS390S1                                                                      |                           |       |      |
| Unit address . . . . .                                 | 06 + (Only necessary when different from the last 2 digits of device number) |                           |       |      |
| Time-out . . . . .                                     | No (Yes or No)                                                               |                           |       |      |
| STADET . . . . .                                       | Yes (Yes or No)                                                              |                           |       |      |
| Preferred CHPID . . . . .                              | __ +                                                                         |                           |       |      |
| Explicit device candidate list . . .                   | No (Yes or No)                                                               |                           |       |      |
| F1=Help F2=Split F4=Prompt F5=Reset F9=Swap F12=Cancel |                                                                              |                           |       |      |

Figure 29. Define Device

|                                                        |             |               |       |         |
|--------------------------------------------------------|-------------|---------------|-------|---------|
| Goto                                                   | Filter      | Backup        | Query | Help    |
| Add Device                                             |             |               |       |         |
| Specify or revise the following values                 |             |               |       |         |
| Device number . . . . .                                | C806        | (0000 - FFFF) |       |         |
| Number of devices . . . . .                            | 2__         |               |       |         |
| Device type                                            | OSA _____ + |               |       |         |
| Serial number . . . . .                                | _____       |               |       |         |
| Description . . . . .                                  | _____       |               |       |         |
| Connected to CUs . .                                   | C800        | _____         | _____ | _____ + |
| F1=Help F2=Split F4=Prompt F5=Reset F9=Swap F12=Cancel |             |               |       |         |

Figure 30. Add Device



## MPC OAT Entry

### Creating an MPC Entry

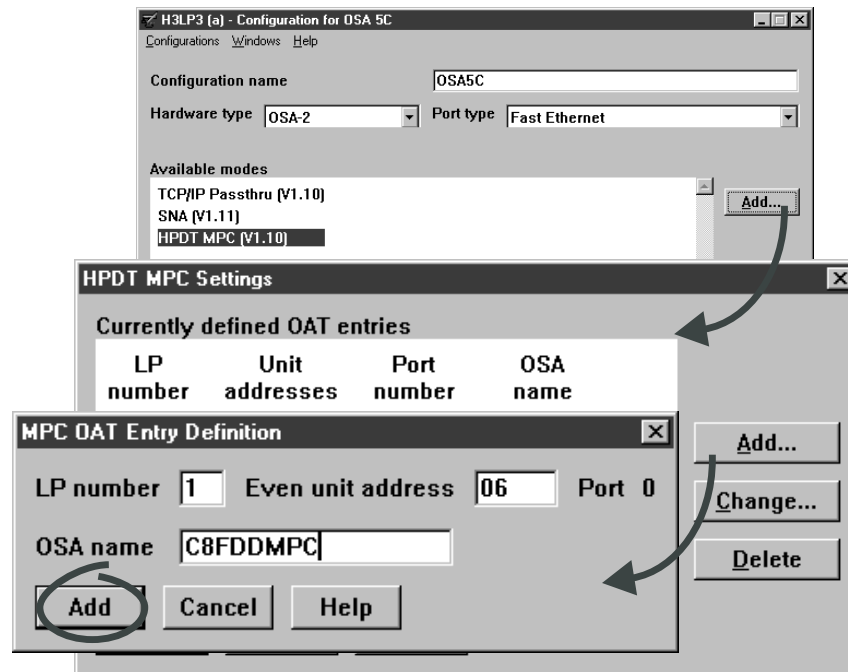


Figure 31. Defining an MPC OAT Entry



#### LP #

If the system is running in LPAR mode and the OSA channel path is defined to be shared by more than one logical partition, specify the LP number of the LP that is associated with this data path. Otherwise, specify 0.

If the FDDI OSA-2 is being run in the TCP/IP Passthru mode concurrently with the HPDT MPC mode, make sure the Home IP address or addresses to be used in the concurrent TCP/IP Passthru mode are specified in the OSA's Passthru entry (page 81).



#### Even unit address

Specify the unit address that you associated in the system hardware I/O configuration (IOCDs) with the even device number for this mode because you are specifying the inbound data path. OSA/SF will automatically create the corresponding outbound data path with the uneven (odd) unit address.



#### Port number

A FDDI OSA-2 has only port 0 (00).



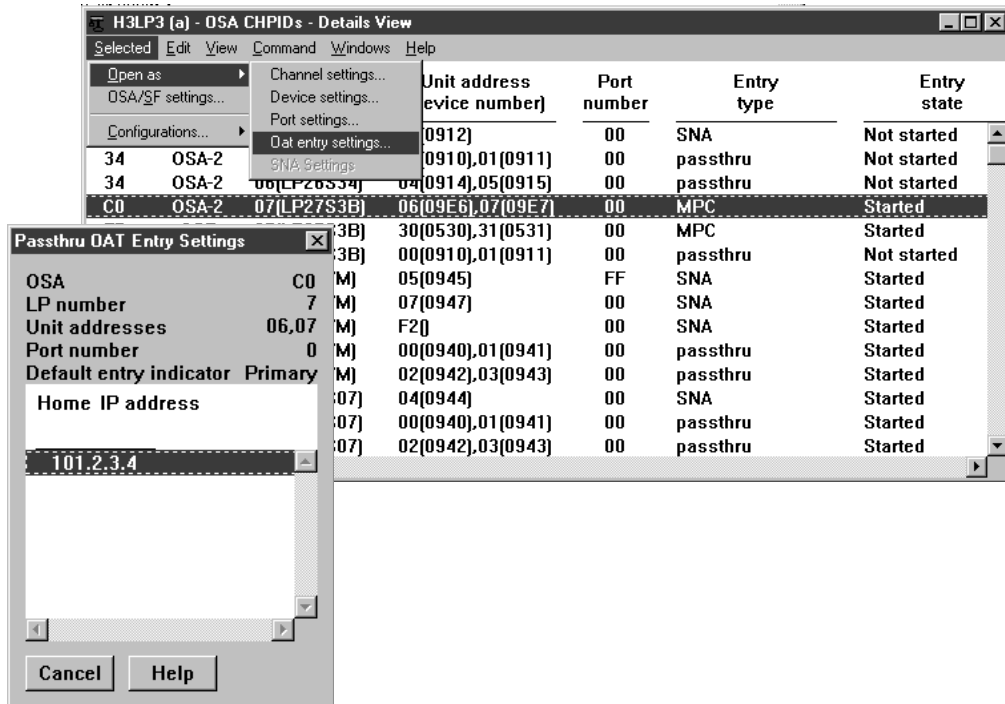
## OSA name

Specify an OSA name of 1 through 8 of the following characters: A through Z in upper case, @, #, \$, and—starting with the second character—0 through 9. Do not specify duplicate OSA names for two or more OSAs that will be defined to the same LP and be run in the same mode.

Specify the same OSA name that you specify for the OSA in this mode to VTAM or Communications Server SNA in the TRLE statement as the VTAM resources definition and in the applicable OEIFCONFIG network interface command.

## Viewing an MPC Entry

**With the PTF Resolution to OSA/SF APAR OW33393:** If this PTF has been applied, the OSA MPC OAT entry looks like the panel shown in the following figure. In this case, the Home IP address is shown for OSA CHPID X'C8' that is transferring IP packets.



**Without OSA/SF APAR OW33393:** OSA/SF does not display or list the Home IP address in the MPC OAT entry. Therefore, OSA/SF lists only those data items that you entered when you created the MPC OAT entry.

## VTAM Resource Definition

To VTAM or Communications Server SNA, specify a VTAM resource definition in the TRL macro TRLE statement as shown in the figure on page 99. Note that the statement label must be the OSA name that you define in the HPDT MPC OAT entry to the OSA and in the OEIFCONFIG command that defines the network address.

## OEIFCONFIG Commands

To define a network interface to the z900 program, start the connection, or stop it, use the OEIFCONFIG, or equivalent commands. Starting with Communications Server for OS/390 V2R8, the MPCOSA TCP/IP device type can be used instead of OEIFCONFIG. For more information, refer to the IP books listed in the bibliography (pages ix-x) especially:

- *Communication Server for z/OS: IP Configuration Guide*, SC31-8775
- *OS/390 eNetwork Communications Server: IP Configuration Guide*.
- *OS/390 eNetwork Communications Server: High Speed Access Services User's Guide*.

## An Example

In the following example, a FDDI OSA-2 is used.

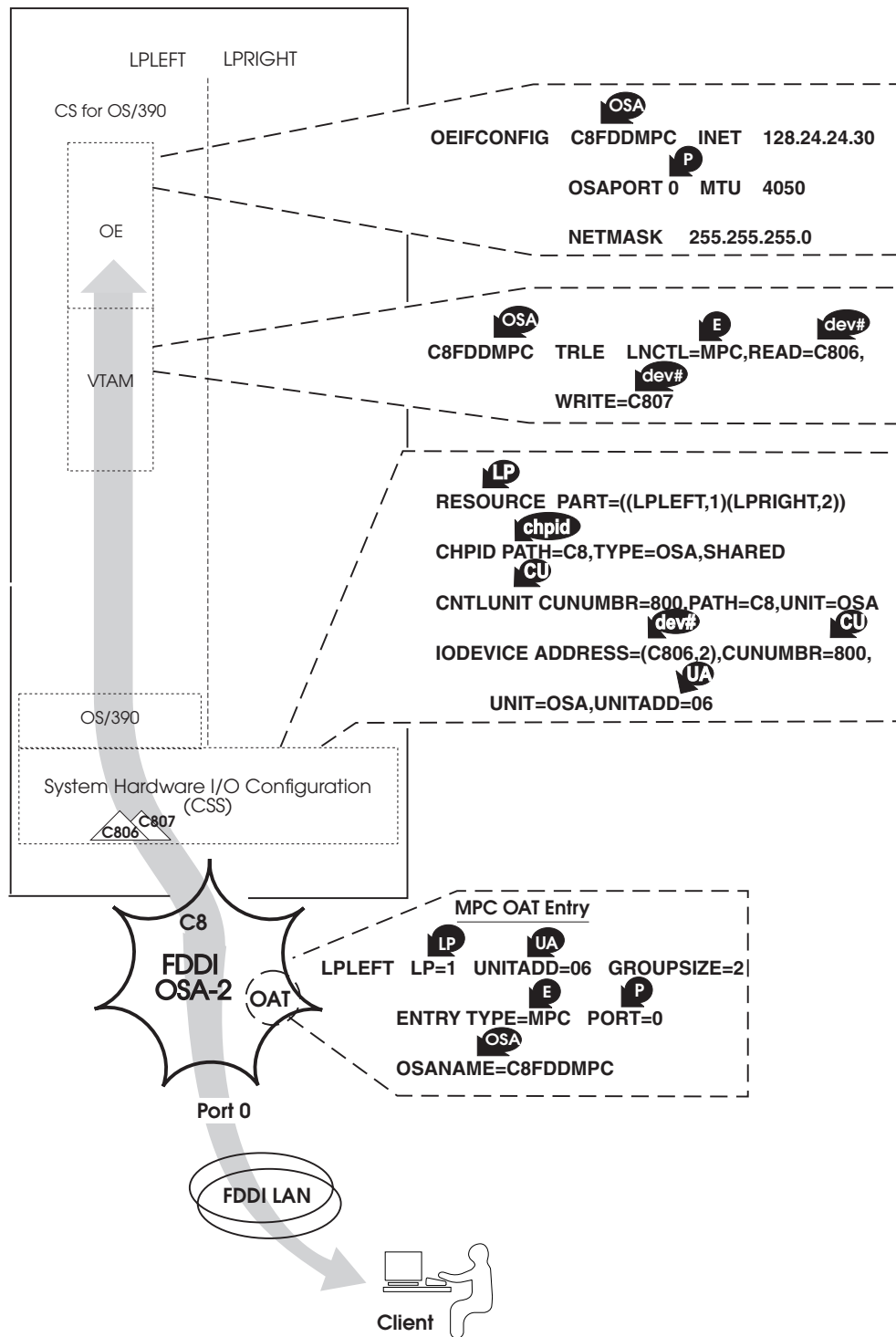


Figure 32. Example of MPC Definitions

---

## Chapter 7. SNA Mode

If an OSA is being run in the SNA mode, it is viewed by VTAM and the SNA function of Communications Server as an external communications adapter (XCA) that can have either switched or non-switched lines of communications.

In this mode, an OSA acts as an SNA passthrough agent to the clients that use the SNA protocol on the LAN that is directly attached to the OSA. Any OSA can be run in the SNA mode in any of the system environments in which it is supported. To make this chapter applicable for all the environments, VTAM examples are used, not examples that show the SNA function of Communications Server.

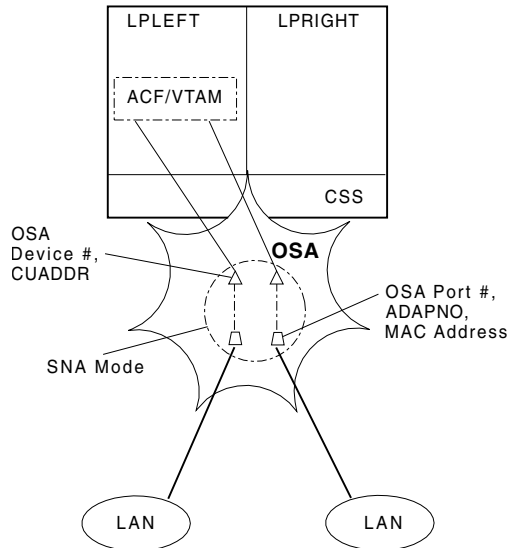
---

### General Notes

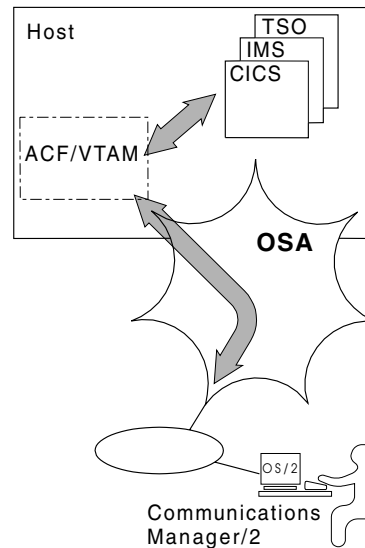
1. A FDDI OSA-2 can be run in the SNA mode concurrently with the TCP/IP Passthru mode or the HPDT MPC mode, or both modes, in those environments that support those modes.
2. A token ring OSA-2 can be run in the SNA mode concurrently with the TCP/IP Passthru mode.
3. In the SNA mode, the OSA transfers data across one of the following:
  - A FDDI LAN that is attached to a FDDI OSA and supports the following frame protocol:  
IEEE 802.2 LAN MAC (ANSI X3T9.5 using the 802.2 envelope)
  - A token-ring LAN that is physically attached to a token ring OSA-2 port and supports the following frame protocol:  
IEEE 802.2 LAN MAC (802.5 using the 802.2 envelope)
4. For more information about Communications Server, refer to the libraries listed in the bibliography (pages ix–x).
5. For more information on VTAM, including VTAM high performance routing (HPR), refer to the VTAM books listed in the bibliography (page xi).
6. In the following two figures, the identifiers for an OSA are shown that are needed for an OSA to be run in the SNA mode. A FDDI OSA is depicted, but the definitions apply to the other OSAs as well.

In these figures, a triangle depicts a z900 device that you have associated with the OSA channel path. VTAM recognizes this device number as the CUADDR. A trapezoid depicts an OSA port, which VTAM recognizes as the ADAPNO, and which the LAN nodes recognize by its MAC address. Two logical partitions are shown: LPLEFT (LP 1) and LPRIGHT (LP 2).

### Definitions for the SNA mode



### Data flow in the SNA mode



---

## Task Planning Checklist

### Preparatory Tasks

- \_\_\_ 1. It is advisable to prepare worksheets for each OSA to keep track of the data items you need to input.
- \_\_\_ 2. Check which OSAs will be run in this mode and whether they will be run concurrently in either the TCP/IP Passthru mode or the HPDT MPC mode, or both modes. (A token ring OSA-2 cannot be run in the HPDT MPC mode.)
- \_\_\_ 3. Ensure the programming requisites and installation factors for this mode are taken into account.
- \_\_\_ 4. Ensure OSA/SF is set up. See the appropriate OSA/SF User Guides whose titles are listed in the bibliography (page vii).
- \_\_\_ 5. Assess your network configuration to determine whether it is useful to set the SNA mode parameters that are discussed on page 106.
- \_\_\_ 6. Plan for the use of this mode, including how to handle problems that can occur.

Information on alertable conditions reported by a token ring and FDDI OSA-2 is provided on page 121. Also, refer to the OSA/SF User's Guides whose titles are listed in the bibliography (page vii).

## SNA Mode Tasks

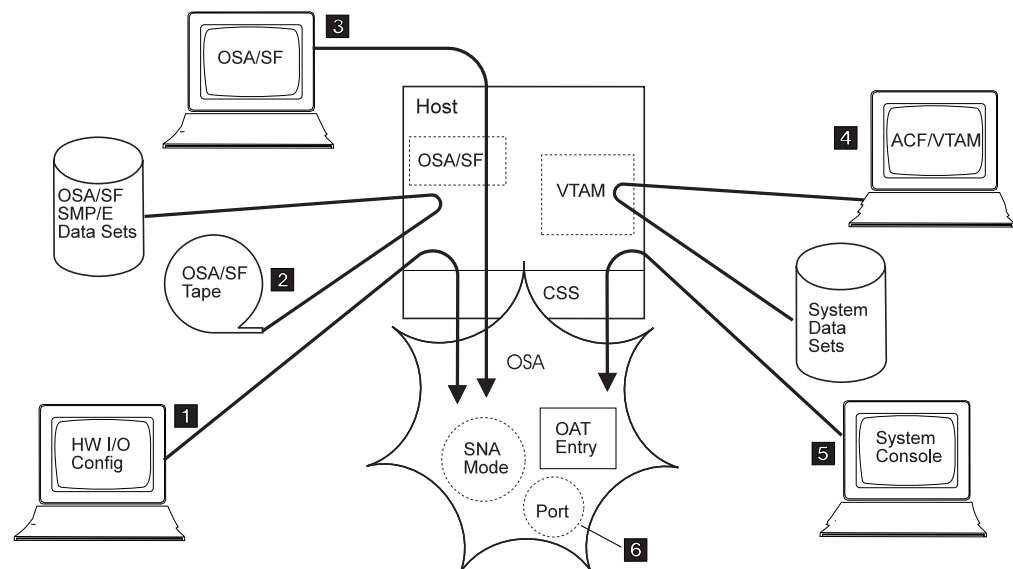


Figure 33. Setting Up OSA-2 and OSA/SF for SNA Mode

**1** Using a system I/O configuration component, such as the Hardware Configuration Definition (HCD) panels or the I/O Configuration Program (IOCP), define one device number for each OSA port to be used (page 103).

If you need to define a Box Manager node (page 121) for a SNA network management program such as NetView, define a separate device number for the OSA's virtual port.

**2** If the SNA mode is not already installed from the OSA/SF tape, do so now.

**3** Using OSA/SF, create a SNA OAT entry for each port being used for data traffic in the SNA mode (page 104).

If a Box Manager node is needed to support a SNA network management service program, for example, NetView, (page 121) for the OSA's virtual port X'FF'.

**4** Identify the OSA to each XCA and SWNET major nodes (page 115). If the OSA mode requires a SNA network management program, such as NetView, enable that program as well.

**5** To activate an OSA mode, the OSA channel and its associated device numbers must be configured off from all the partitions in which the OSA is defined, and then configured back on. (The OSA CHPID must be reset.)

**6** Some port parameters are required to be set and some are optionally settable.

Each port has a SNA notebook page. See page 106.

## System Hardware I/O Configuration Definitions

- Any OSA can be run in the SNA mode. For an introduction to this mode, see page 101.
- You must define one device number for each OSA port to be used for data transfer.
- Specify a unit address value from X'00' through X'FB' for each of these device numbers. Consider specifying a unique range of unit addresses for the SNA



mode, although you might want to exclude the range X'00' through X'09', which is the range of default range of unit addresses used in the TCP/IP Passthru mode.

- A device number is also called the channel unit address (CUADDR) or subchannel address.
- Given the foregoing factors, here's how you would specify (in IOCP format) port 0 on OSA CHPID X'C4' for the SNA mode:

IODEVICE ADDRESS=(C404),CUNUMBR=100,UNIT=OSA, UNITADD=04

- If a Box Manager node is required, define a device for the OSA's virtual port X'FF'.

A Box Manager node is required only for communications with a SNA network management service such as NetView and only if the NetView program-to-program interface (PPI) is not being used.

To define a Box Manager node, see the following example:

IODEVICE ADDRESS=(C40E),CUNUMBR=100,UNIT=OSA, UNITADD=0E

---

## SNA OAT Entry for the SNA Mode

To customize, or configure, an OSA in the SNA mode, you must create a SNA OAT entry using OSA/SF. OSA/SF then stores, or downloads, the SNA OAT image on the OSA. Optionally, you can change some of the OSA port parameters that are also stored on the OSA. You make those changes using OSA/SF as well. Whenever these images are changed on the OSA, you must configure the CHPID and its associated devices off from all the logical partitions (LPs) to which it is defined, and then configure them back on. Obviously, therefore, it is prudent to plan for each OSA mode with care to minimize this effort.

Create a SNA OAT entry for each pair of read/write, inbound/outbound data paths for a unit address and LP being used in this mode. In this book, the OSA/SF OS/2 interface (GUI) panels are shown, but you can use any of the other OSA/SF user interfaces. In an OS/390 environment, for example, you can access OSA/SF through IOACMD at the TSO/E command line.

### Notes:

1. If a SNA network management service, such as NetView, is being used for a TR OSA-2 or for a FDDI OSA-2, create an additional SNA OAT entry for the SNA network management type for the Box Manager node.
2. You do not have to specify the LAN type to OSA because OSA/SF does that automatically. However, you must specify this as the medium parameter value in the XCA Port Definition statement:
  - A FDDI LAN attachment matches VTAM MEDIUM=FDDI
  - A token-ring LAN attachment matches MEDIUM=RING in the XCA node.

**SNA OAT Entry Definition**

LP number  Unit address  Port

OAT entry usage

☒ SNA native

☐ SNA network management

VTAM IDNUM

Figure 34. A FDDI OSA-2 Panel



### **LP #**

For a SNA native OAT entry for a FDDI or token ring OSA-2, specify:

- The logical partition (LP) number of the LP in which the host program is running if the system is running in LPAR mode and the OSA is defined as shared.
- Otherwise, enter 0 regardless whether the system is running in LPAR or basic mode.

For a SNA network management OAT entry, specify the logical partition (LP) number of the LP in which the SNA network management service, for example, NetView, is running.



### **Unit address**

Specify the unit address of the OSA device number that you associated with this OSA CHPID in this mode for this LP or system in basic mode. (See the discussion on the system hardware I/O configuration that starts on page 103.)



### **SNA native**

Accept this default SNA record type if you are specifying an OAT entry for a physical OSA port.



### **SNA network management**

Specify this record type if you are specifying a Box Manager node (page 121). The associated port number is automatically virtual port X'FF'.

For a Box manager node, additionally:

- Specify the IDNUM

in the SWNET VBUILD statement as 1–5 hexadecimal characters for the Format 1 XID exchange with the OSA task. Remember to specify the same number in the OSA PU parameter in the SWNET major node.

- In the Port Definition statement of the XCA major node for this connection, specify BOXMGR.
- Activate the SWNET major node before the XCA major node. Otherwise the Boxmanager PU stays in a connectable (CONCT) state. The line does not become active; you get the IST690I message instead.
- Remember to specify a separate device number for the OSA *virtual port* FF in the system hardware I/O configuration (page 103) and in the Port Definition statement of the XCA Mode.

## Expanded Set of SNA Mode Port Parameters

### Notice!

The expanded set of SNA mode port parameters requires that the PTF resolution to one of the following OSA/SF APARs has been applied: OW30222 (OS/390 and MVS/ESA), OW30932 (VM/ESA), or PQ11504 (VSE/ESA).

- If the PTF to any of these APARs has been applied, read the following descriptions.
- If the PTF to none of these APARs has been applied, a subset of these parameters will be available.

If an OSA-2 is being run in the SNA mode, you can set a number of SNA mode port parameters. They are illustrated in this book with the OSA/SF OS/2 interface (GUI) panels. You can, however, use another OSA/SF interface.

## An OSA Port's Expanded SNA Notebook Page

The following panel is shown in its initialized state.

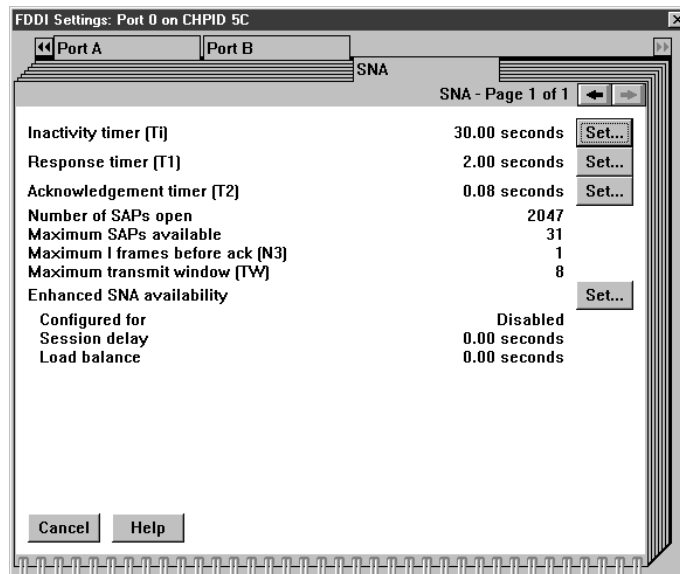


Figure 35. Expanded Set of Parameters on SNA Notebook Page

| In Summary:          | Token Ring OSA-2 | FDDI OSA-2 |
|----------------------|------------------|------------|
| Ti and T1 LLC timers | Settable         | Settable   |

| In Summary:                                          | Token Ring OSA-2                  | FDDI OSA-2                        |
|------------------------------------------------------|-----------------------------------|-----------------------------------|
| T2 LLC timer                                         | Settable but not effective (N3=1) | Settable but not effective (N3=1) |
| N3 count                                             | Settable but not effective (N3=1) | Not settable (N3=1)               |
| TW count                                             | Not settable (TW=8)               | Not settable (TW=8)               |
| Maximum PUs supported (Note 1)                       | APAR dependent (255 or 2047)      | APAR dependent (255 or 2047)      |
| Maximum SAPs supported (Note 2)                      | 31                                | 31                                |
| SNA session availability options available? (Note 2) | If connected to a TR LAN          | Yes                               |

#### Notes:

1. The maximum PU limit depends on the OSA and the level of the SNA image that is downloaded on it. See page 116 and the requirements for the SNA mode for each operating system in the earlier chapters.
2. The maximum number of SAPs that can be opened is one for each application in each logical partition (LP). This number is 16 although the maximum is a theoretical 31 on the token ring and FDDI OSA-2 panels.  
This number of SAPs excludes the null SAP or a SAP needed for a Box Manager node for NetView communications (page 121).

## Inactivity Timer (Ti)

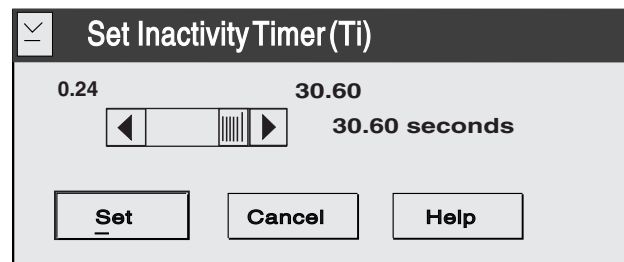


Figure 36. Token Ring or FDDI OSA-2 Panel

#### Notes:

1. For a token ring or FDDI OSA-2 port, the Ti timer is initialized to be enabled and set to its maximum value of 30.60 seconds. You cannot disable the Ti timer; you can set a timeout value in increments of 0.12 seconds from 0.24 to 30.60 seconds.
2. An enabled inactivity timer (Ti) periodically tests the viability of the network media. The timer setting applies to all the clients on the target LAN, not to individual clients. The timer interval indicates how quickly a failure of the network media can be detected when the connection is quiescent.
  - If the Ti timer times out, a supervisory poll frame is sent over the connection. The T1 response, or reply, timer clocks the supervisory poll.
  - If the T1 timer times out, the supervisory poll is retransmitted. OSA can retransmit a supervisory poll up to 8 times.
  - If no response is received after the last retransmission, the link is declared inoperative, and the host program issues a message.

3. If you set the Ti timer, make sure its interval exceeds the T1 timer limit. Consider setting the Ti timer to a value that is at least 5 times greater than the T1 timer.
4. If you set the Ti timer using the REXX interface and you do not specify the increment properly, OSA/SF rounds the value up to the nearest increment.

## Response, or Reply, Timer (T1)

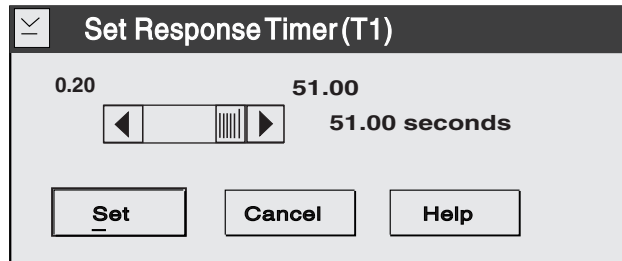


Figure 37. Token Ring or FDDI OSA-2 Panel

### Notes:

1. T1 timer is initialized to 2 seconds and can be set to a timeout value from 0.20 up to 51.00 seconds in increments of 0.20 seconds.
2. The T1 timer clocks link events that require responses from clients on the network. These link events include SABME / UA exchanges, I-frame link protocol data unit (LPDU) transmissions, and supervisory polls.
3. Set the T1 timer to a value that is not less than the average round-trip transit time from the OSA to the clients and back.  
If the round-trip transit time is small, consider setting the T1 timer to a relatively low value because recovery will be initiated more quickly when an I frame is dropped. Further, a T1 timer interval that exceeds 2 seconds can result in noticeable delays to those responses that must be retransmitted. However, retransmissions should occur infrequently and only during bursts of peak activity on the network.
4. Check the timer parameter value that is specified in the XCA Port Definition statement. Make sure the XCA timer is set to a value that is greater than  $(N2+1)*T1$ . Since  $N2=8$  (retransmissions) for OSA, set the timer to a value that is greater than  $(9*T1)$ .  $N2$  = the maximum number of retransmissions.
5. If you set the T1 timer using the REXX interface and you do not specify a multiple of 0.20 seconds, OSA/SF rounds the value up to the nearest increment of 0.20 seconds to a maximum of 51 seconds.

## N3 and TW Counts

For a token ring or FDDI OSA-2, you cannot change the  $N3=1$  count.

In determining the maximum I-frames that can be sent before an acknowledgment is sent (N3 count) and the maximum number of outstanding I-format link protocol data units (LPDUs) (TW count), consider the N3 and TW counts that are set at the clients as well.

### Notes:

1. The maximum number of outstanding I-format link protocol data units (LPDUs) (TW count) is also called the maximum transmit window count or the maximum window out count.

The TW count allows the sender to transmit frames before that sender is forced to halt and wait for an acknowledgment. Therefore, the receiver should be able to absorb that number of frames, either in its service access point (SAP) buffers or within the buffers in workstation memory.

2. A small TW count reduces the chances that frames are retransmitted owing to buffer congestion at the receiver.

## SNA Session Availability Options

### Planning Tasks

#### ***1. Decide which OSA-2 ports to use.***

- Assess the network configuration and user community in terms of their traffic distribution and potential tolerance for delay times. Because these factors are site-dependent, they fall outside the scope of this book.
- Specify the same local MAC address for the following ports:
  - All the ports for which you specify the Overflow option and their backup ports for which you specified the Overflow and Redundancy option.
  - All the ports for which you specify the Load Balancing option and their backup ports for which you specified the Loading Balancing and Redundancy option.

These local MAC addresses should be active before an OSA is being run in the SNA mode. Note that you can set a local MAC address (page 128) using OSA/SF if the PTF resolution to OSA/SF APAR OW30222 (OS/390 and MVS/ESA), OW30932 (VM/ESA), or PQ11504 (VSE/ESA) has been applied.

#### ***2. Make sure the ports with identical local MAC addresses are attached to different LAN segments.***

Figure 38 on page 110 shows an illustration of bridging LANs for four token ring OSA-2 ports.

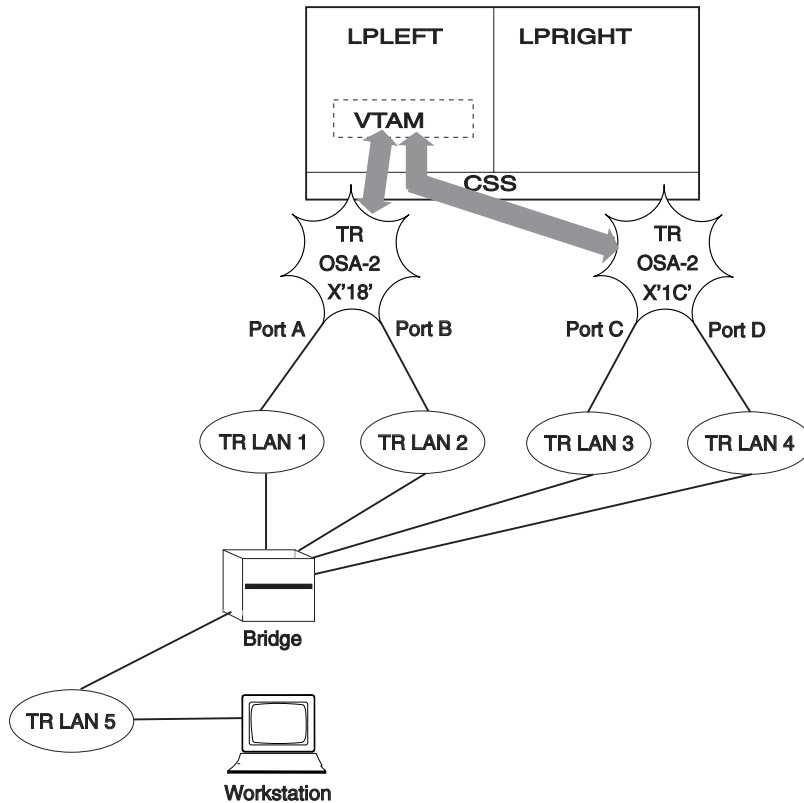


Figure 38. Bridging LANs for Four Token Ring OSA-2 Features

**3. In the XCA major node, set the maximum number of stations (PUs) that can be logged on to each OSA port.** The maximum number of PUs depends on several factors. For a list, see page 116 and the requirements listed in the earlier chapters for each operating system that OSA supports.

**4. Ensure that the host program, such as the OS/390 eNetwork Communications Server SNA application or VTAM, has paths defined through all the ports with the same local MAC address.**

- Open only one SAP for each z900 application that is communicating with a port.
- Do not configure the XCA macro to use NETBIOS SAP X'F0'.
- In the SWNET major node, ensure the MAXPATH value is large enough to accommodate all the paths that will be used.

**5. Specify the OSA/SF SNA session availability options** by selecting them from the OSA/SF **Enhanced SNA Availability** panel. After setting these options, reset the OSA channel path of each member so the changes can take effect.



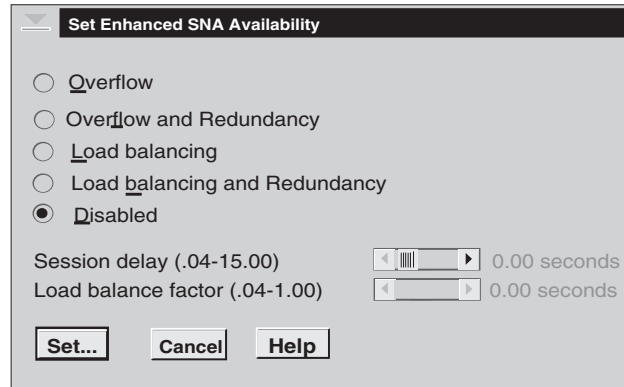


Figure 39. Token Ring or FDDI OSA-2 Panel

### Overflow Option (Token Ring, FDDI OSA-2)

This option causes the specified port to stop responding to connection requests when it reaches its maximum station count, or PU limit. The maximum PU limit, which is defined for the port to VTAM (page 116) or the SNA function of Communications Server, defines that port's overflow threshold. Once the OSA port is in an overflow condition, it stops responding to connection requests.

Note that OSA makes no attempt to ensure an even distribution of the clients across the participating OSA ports. If more than one port is responding to connection requests, the first response that the client receives typically determines which OSA port is selected for the connection. However, other factors can affect this selection. Therefore, the exact distribution of connections across the OSA ports depends on delays in the network and the implementation of the clients.

For example, assume the following configuration and current state.

| Port | Option   | Max PU limit | Current session count | Status          |
|------|----------|--------------|-----------------------|-----------------|
| A    | Overflow | 347          | 347                   | Online (Note 1) |
| B    | Overflow | 300          | 183                   | Online (Note 2) |
| C    | Overflow | 347          | 27                    | Online (Note 2) |

#### Notes:

1. With the current session count equal to the maximum PU limit, port A has reached its overflow threshold and stopped responding to connection requests.
2. Whether port B or port C is selected for a connection is governed by delays in the network.

### Overflow and Redundancy Option (Token Ring, FDDI OSA-2)

This option together with the session-delay time that you define for the port prescribes that the specified port delays its response to a connection request by that amount of time. This delay allows the port to provide a backup, or redundant, path for a port for which the overflow option is specified.

For example, assume the following configuration and current state.

| Port | Option                  | Session delay | Max PU limit | Current session count | Status          |
|------|-------------------------|---------------|--------------|-----------------------|-----------------|
| A    | Overflow                | N/A           | 347          | 0                     | Failed          |
| B    | Overflow                | N/A           | 300          | 300                   | Online (Note 1) |
| C    | Overflow and Redundancy | 0.32 sec      | 347          | 5                     | Online (Note 2) |
| D    | Overflow and Redundancy | 0.32 sec      | 300          | 62                    | Online (Note 2) |

**Notes:**

1. With its current session count equal to its maximum PU limit, port B has reached its overflow threshold and stopped responding to connection requests.
2. Ports C and D will respond after their specified session delays, which is 0.32 seconds in this example. Additional connections will be established to ports C and D in an order that depends on delays in the network. The first port that reaches its maximum PU limit will stop responding, and any remaining connection requests will be logged onto the other port.

For instance, suppose there are more connection requests and port D reaches its maximum PU limit first. Now, port C will respond to the remaining connection requests until it reaches its overflow threshold.

In this example, a satisfactory redundant configuration is represented for up to 647 connections assuming that it was intended to accommodate a simultaneous failure of both ports A and B.

### Load Balancing Option (Token Ring, FDDI OSA-2)

With this option, you allow two or more ports to balance their connection requests. Load balancing is only related to the *number* of connections (PUs); it is not related to either the traffic volume or the workload across those connections.

For example, assume the following configuration and current state.

| Port | Option         | Load balance factor | Max PU limit | Current session count | Status          |
|------|----------------|---------------------|--------------|-----------------------|-----------------|
| A    | Load balancing | 0.08 sec            | 256          | 256                   | Online (Note 1) |
| B    | Load balancing | 0.08 sec            | 480          | 256                   | Online (Note 2) |
| C    | Load balancing | 0.08 sec            | 1024         | 238                   | Online (Note 2) |

**Notes:**

1. Port A has a maximum PU limit that is much lower (256) than the limit for ports B (480) and C (1024). Because port A has reached its maximum PU limit, it has stopped responding to connection requests.
2. The current session count for port B is 256 and for port C it is 238 sessions. Both ports will respond to connection requests.

Because the load balancing option has been specified for both of them, the delay for each port is proportional to the number of connections it has before the response to the next connection request is issued.

To calculate the total delay for the next connection request for each port, obtain the multiplier factor from the table on page 114.

- With a current session count of 256 sessions, port B's total delay time =  $0.08 * 6 = 0.48$  seconds.

- With a current session count of 238 sessions, port C's total delay time =  $0.08 * 5 = 0.40$  seconds.

Port C would therefore respond to a new connection request before port B. Hence, a connection would be established for port C, which would bring its session count up to 239. Although, typically the first response that a client receives determines which OSA port is selected for the connection, note that other factors can affect this selection.

### Load Balancing and Redundancy Option (Token Ring, FDDI OSA-2)

This option allows you to specify redundant paths for the ports for which you specified the load-balancing option.

For example, assume this configuration and current state.

| Port | Option                        | Load balance factor | Session delay     | Max PU limit | Current session count | Status          |
|------|-------------------------------|---------------------|-------------------|--------------|-----------------------|-----------------|
| A    | Load balancing                | 0.08 sec            | N/A               | 1000         | 324                   | Online (Note 1) |
| B    | Load balancing                | 0.08 sec            | N/A               | 1000         | 362                   | Online (Note 1) |
| C    | Load balancing and redundancy | 0.08 sec            | 0.80 sec (Note 2) | 1000         | 0                     | Online          |
| D    | Load balancing and redundancy | 0.08 sec            | 0.80 sec (Note 2) | 1000         | 0                     | Online          |

#### Notes:

1. As you can see from the table on page 114, the multiplier factor is 6 for both ports A and B. Since ports C and D have a 0 current session count, it is currently 0 for these ports.

In the current state, the total delay for ports A and B is 0.48 seconds ( $0.08 * 6$ ), so the port that acquires the next connection will be determined by delays in the network. When either port A or port B reaches 384 connections, its delay will be 0.54 seconds ( $0.08 * 7$ ). At that time, the other port will respond 0.08 seconds sooner until its total connection count reaches 384.

2. When deciding on the session delay time for the two redundant ports C and D, look at the maximum delay that can occur for the primary ports, which are ports A and B in this example.

In this example, the maximum delay for the primary load-balancing ports (A and B) cannot exceed 0.72 seconds ( $0.08 * 9$ ), and is reached when 1000 connections are logged onto either of these two ports.

To prevent any traffic from being established on the redundant ports C and D while ports A and B are still responding to connection requests, set the session delay for the redundant ports (C and D) to a value that at least equals the longest potential delay for the primary ports (A and B). Since a connection request for port A or B can be delayed by 0.72 seconds, 0.80 seconds was chosen for the session delay time for the two redundant ports (C and D).

### Disabled Option (Token Ring, FDDI OSA-2)

When each OSA-2 is shipped, its SNA session availability option is initialized to the Disabled option. In this context, Disabled means that none of the other SNA session availability enhancement options are active for this port.

### Session Delay (0.4–15.00 Seconds) for Redundancy

When each OSA-2 is shipped, its session delay is initialized to 0 seconds. For the Redundancy, Load balancing and Redundancy, and Overflow and Redundancy options:

- Specify a nonzero delay time in increments of 0.04 seconds up to 15 seconds.  
Base the value on the longest delay time that can be incurred by the non-redundant members of the set for which the port is a backup. For example, you could specify a session delay of 10 seconds.
- To calculate the total delay time for a port if you specify the Load balancing and Redundancy option, add the session delay time to the delay that you calculated for the load balancing option.

### Load Balance Factor (0.4-1.00 Seconds)

The load balance factor is initialized to 0 seconds. For the two options, Load balancing and Load balancing and Redundancy, specify a nonzero factor in 0.04-second increments up to 1 second.

In general, the load balancing factor should be set to the same value for all the ports configured for load balancing. Although the optimal setting depends on the network configuration, a reasonably high degree of balance can be obtained with a small load balance factor. For most networks, a load balance factor of .08 seconds is suitable. You should set the same load balance factor for all the ports in the set for which you specify this option.

To calculate the total delay time for a session, multiply the load balance factor by a multiplier factor ( $m$ ). For the Load balancing and Redundancy option, add the session delay time to this result. As the following table shows,  $m$  is a function of the number of sessions that are logged on to the port.

| Current Session Count | Multiplier factor $m$ | Current Session Count | Multiplier factor $m$ | Current Session Count | Multiplier factor $m$ |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| 0–15                  | 0                     | 64–127                | 4                     | 512– 767              | 8                     |
| 16–31                 | 1                     | 128–255               | 5                     | 768–1023              | 9                     |
| 32–47                 | 2                     | 256–383               | 6                     | 1024–1535             | 10                    |
| 48–63                 | 3                     | 384–511               | 7                     | 1536–2047             | 11                    |

**For the Load Balancing option:** the total delay is not just the load balance factor. For example, assume that you specified a load balance factor of 0.08 seconds. There is no delay for the first 15 sessions logged on to a port ( $0 * 0.08$ ); the 16th through the 31st sessions are delayed by 0.08 seconds ( $1 * 0.08$ ); the 32nd through 47th session are delayed by 0.16 seconds ( $2 * 0.08$ ), and so on.

**For the Load Balancing and Redundancy option:** add the session delay time to the delay that you would calculate for load balancing. Continuing with the example, assume that you had specified a session delay of 1.2 seconds in addition to the load balance factor of 0.08 seconds for the redundant ports for which you select the Load balance and redundancy option.

- The total delay for each of the first 15 connections is 0.12 seconds ( $0 * 0.08 + 1.2$ ).

- The delays for connections 16 through 31 is 1.28 seconds by 1.28 seconds ( $1 * 0.08 + 1.2$ ); the 32nd through 47th session are
- The delays for connections 32 through 47 is 1.36 seconds ( $2 * 0.08 + 1.2$ ), and so on.

---

## XCA and SWNET Definitions Relevant to the OSA Mode

In this section, the OSA-related VTAM statements are described. For more information on these VTAM macros, refer to the VTAM books listed in the bibliography (page ix). For example, *VTAM V4R2 Resource Definition Samples*, which is listed in the bibliography (page ix), provides detailed examples.

For information on Communications Server SNA, also refer to the books listed in the bibliography (pages ix–x).

### Notes:

1. Define each OSA port in the XCA mode to provide APPN-to-APPN communications via an OSA.  
An OSA port can be used to connect a composite network node or an end node or a network node with any other type of APPN node.
2. Define each OSA port in the XCA mode and each peripheral device in the SWNET node to provide peripheral support.  
Peripheral support attaches VTAM to peripheral nodes connected to the directly-attached LAN or emulated LAN (ELAN).
3. Define each OSA port in the XCA mode and each subarea connection in the SWNET to provide subarea support.  
Subarea support attaches VTAM to a subarea node that is connected to the LAN or ELAN.
4. Specify the maximum number of stations, or PUs, for each port. See page 116 and the SNA mode requirements for each operating system in the earlier chapters.  
Note also that once a PU is activated within an XCA for a given OSA port, it cannot become available for another instance of VTAM.
5. For parameter values need for HPR over XCA support, refer to the VTAM books listed in the bibliography (page xi).
6. For the VTAM definitions for the optional SNA network management service, such as NetView, see page 123 first.

## External Communication Adapter (XCA) Major Node

Associate one XCA major node for each OSA port that will be used. If a SNA network management service is being used, specify an XCA mode for the virtual port (X'FF') that is used. Define:

1. The node type in the VBUILD Definition statement
2. The OSA port used in the PORT Definition statement
3. The switched peripheral nodes that are attached to the LAN or ELAN through the OSA port in the GROUP, LINE, and PU Definition statements.

If you have both subarea nodes (type 4 and type 5 nodes) and peripheral nodes (type 1, type 2, type 2.1, and subarea nodes that appear as type 2.1 nodes) attached to the LAN or ELAN, you must code two GROUP definition statements in this XCA major node (one for the peripheral devices, and one for the subareas).

## VBUILD Definition statement

Specify one VBUILD Definition statement for each OSA port, that is, for each connection between VTAM and the LAN, ELAN, or SNA network management service.

*name* VBUILD TYPE=XCA

### name

Specify the unique name for this major node.

## PORT Definition statement

Specify one PORT Definition statement for each VBUILD statement to define the OSA port number and port type as well as the device address (OSA device number) for VTAM to use.

*name* PORT ADAPNO=*adapter\_number*, CUADDR=*device\_address*,  
MEDIUM=*medium\_type*, SAPADDR=*address*, TIMER=*timeout\_value*

### name label

Specify the VTAM name you want to associate with the OSA port.



### adapter\_number

Specify the OSA port number for data transfer (0 or 1). If this statement is for a Box Manager node, do not specify this parameter.



### device\_address

Specify the device address to be used by VTAM. This value is the OSA device number. In the device address, the unit address defaults to the last 2 digits of the device number.



### medium\_type

Define the type of LAN (or ELAN ) connected to this OSA port. Specify RING for token ring and FDDI for FDDI. If this statement is for a Box Manager node, specify BOXMGR.



### SAP address

Specify the service access point (SAP) address for the connection to a LAN attached through an OSA that is defined by this XCA major node. This value must be a multiple of 4 and must be unique for each VTAM that is sharing an OSA port.

### timer

Specify a value that exceeds (T1 \* 9). If you accept the default T1 value of 2 seconds, the default XCA timeout value of 30 seconds meets this requirement. The T1 value is described on page 108.

## GROUP Definition statement

Specify a line group for type 2 or 2.1 nodes attached through OSA. You also need to define LINE and PU statements for each switched line and each peripheral node with which VTAM will communicate.

***You must set a maximum PU limit for each OSA-2 port.***

**Notes:**

1. This total consists of the number of Autogens in the Autogen statement and the line and PU Definition statements that you specify separately.
2. You must set the maximum PU limit for any other OSA to either 255 or 2047, depending on the OSA/SF APARs that have been installed. For these APAR numbers, refer to the SNA mode requirements that are stated in the earlier chapters for each operating system that OSA supports.
3. For the SNA mode requirements, refer to page 31 (z/OS and OS/390), page 46 (VM), and page 62 (VSE/ESA).



name GROUP AUTOGEN=(number\_of\_autogens, line\_seed\_char, pu\_seed\_char)  
DIAL=dial\_value

**name**

Specify the minor node name of the line group.

**number\_of\_autogens**

Specify the number of VTAM generated LINE and PU statements.

**line\_seed\_char**

Define the first character to be used by VTAM to create a name for the generated LINE statements.

**pu\_seed\_char**

Define the first character to be used by VTAM to create a name for the generated PU statements.

**dial\_value**

Specify DIAL=Yes for a peripheral node to specify that the lines under the GROUP statement require switched line control protocols. Do not specify this parameter if the statement is for a NetView (SNA network management service) connection.

**LINE and PU Definition statements**

Either specify them separately or let them be generated automatically with the AUTOGEN parameter on the GROUP definition statement.

## Switched Network (SWNET) Major Node

Define one SWNET major node for the switched connections to the peripheral nodes that are attached to the LAN or ELAN connected to the OSA port.

- Define the node type in the VBUILD Definition statement.
- Define one remote physical unit (PU) in the PU Definition statement. Make sure the number of PUs that you define are supported by the OSA. The token ring and FDDI OSA-2s support a maximum of either 255 PUs or 2047 PUs, depending on the code level and whether the proper PTF has been applied. Refer to the requirements that are listed for each z900 operating system in the preceding chapters.
- For each PU, define its associated logical units (LUs).
- Optionally, you define a path in the Path Definition statement.

**VBUILD Definition statement**

Define one SWNET major node for any peripheral devices connected to the LAN defined by the associated XCA major node.

*name* VBUILD TYPE=SWNET MAXNO=*max\_number* MAXGRP=*max\_group*

**name**

Specify the name for this major node.

**max\_number**

Specify the number of unique numbers that are defined in the DIALNO operand of all PATH definition statements with the switched major node.

**max\_group**

Specify the number of unique path groups (group names) that are defined in the GRPNM operand of all PATH definition statements within the switched major node.

**PU Definition statement**

Define one PU for each physical unit that is connected to the LAN defined by the associated XCA major node.



*name* PU ADDR=*link\_station\_address* CPNAME=*control\_point\_name*  
PUTYPE=*pu\_type*

**name**

Specify the minor node name of the physical unit represented by this definition statement.

**link\_station\_address**

Specify the hexadecimal station address for the physical unit.

**control\_point\_name**

Specify the control point name of a type 2.1 peripheral node. A type 2.1 node requires the CPNAME of both IDBLK and IDNUM on the PU definition statement.

**pu\_type**

Specify the PU type for this peripheral. Specify 2 for PU type 2 or 2.1 and for the BOXMGR medium that is needed for communications with a SNA network management service.

**PATH Definition statement**

Define a path to a physical unit (PU) in a switched major node.



*name* PATH DIALNO=*number* GRPNM=*group\_name*

**name**

Specify the name for the Path definition statement.



**number**

The 1st byte is a placeholder (usually 01). The 2nd byte is the SAP address, and the 3rd through 8th bytes are the MAC address of the peripheral (attached workstation).



**group name**

Specify this name as the name of the logical group definition of the associated XCA major node.

**LU Definition statement**

Define one LU for each logical unit associated with a type 1 or 2 PU within a switched major node.

*name* LU LOCADDR=*loc\_address*

**name**

Specify the minor node name of the logical unit represented by this definition statement.

**loc\_address**

Specify the logical unit's local address at the physical unit.

## At the Physical Unit (PU)

- Configure the unit to support the SNA protocol.
- Specify the CPNAME or the IDBLK/IDNUM pair. This must match the information specified on the PU definition statement under the switched major node.
- Define the MAC address of the OSA port that should be used to connect to VTAM. An OSA port's MAC address can be set to a local MAC address (page 128) to help you avoid reconfiguring existing units.

## An Example of the SNA Mode

In Figure 40, a FDDI OSA-2 has been configured to be run in the SNA mode and TCP/IP Passthru mode concurrently. Access to port 0 is therefore shared between the two LPs.

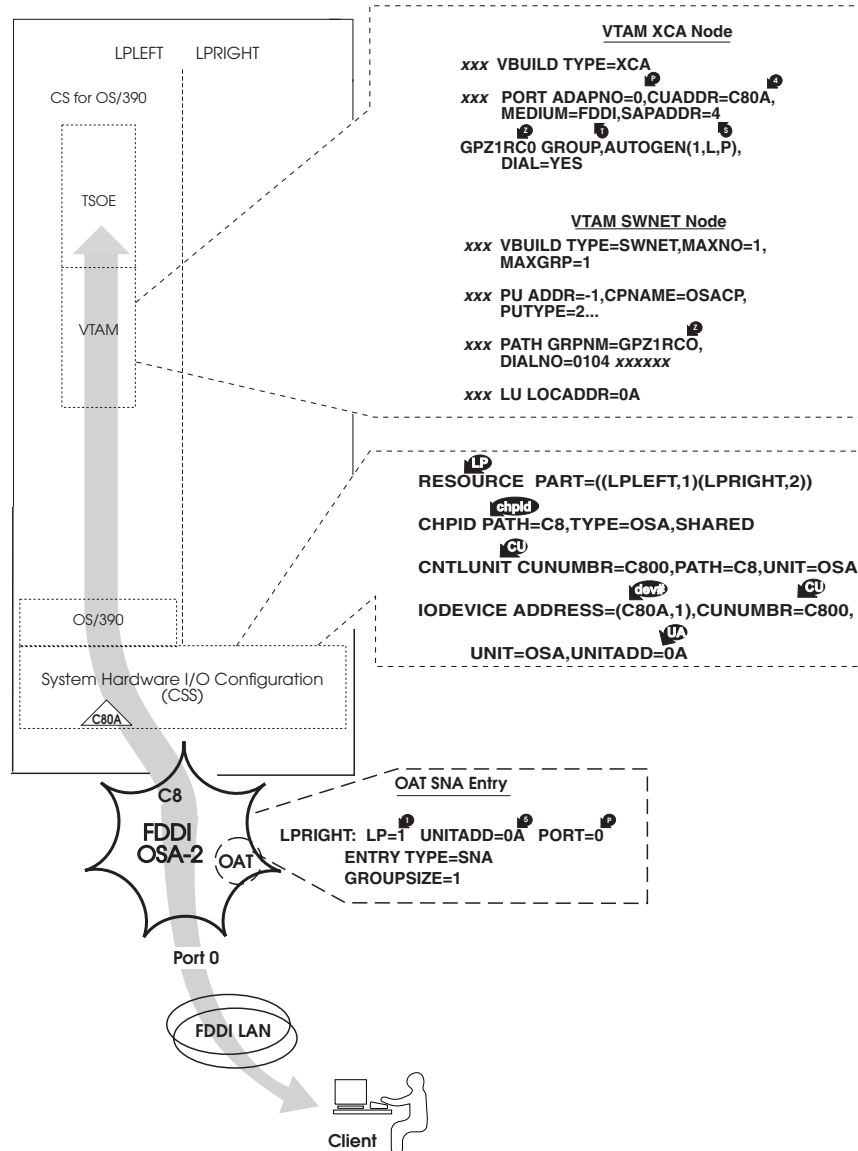


Figure 40. Example of SNA Mode Configuration

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## Chapter 8. OSA Network Management Services

An OSA's network activities can be monitored by OSA/SF, NetView, and several host and network management services. Except for OSA/SF and some NetView and SNMP activities that depend on OSA/SF, refer to the books provided by the relevant product. In this OSA-centric book, the following OSA network management areas are discussed that relate to OSA/SF:

- Basic MIB II support through LCS TCP/IP support.
- Support for the Box Manager node when an OSA is being run in the SNA mode. See the discussion that starts on page 121.

---

### SNA Mode Box Manager Node Support

A token ring or FDDI OSA-2 that is being run in the SNA mode can support a Box Manager node (page 123) through its virtual port X'FF' for communications with a network management service such as NetView.

Through the Box Manager node, an OSA alerts the network management service that is running on the system image that is in the LP associated with that OAT entry whenever the OSA is being run in the SNA mode and one of the alertable conditions listed in the next section occurs. The OSA can also be queried to provide relevant data about its hardware, software. If NetView is being used, it can monitor events related to the SNA/APPN operations of an OSA that has been defined to any partition in which VTAM is running. To monitor these events, NetView's Network Problem Determination Application (NPDA), or hardware monitor, must be used.

### Operational Information

If you are familiar with the support provided by communications controllers, such as the IBM 3172, you can see that OSA support is very similar.

#### Unsolicited Generic Alerts

Upon detecting one of the following alertable conditions, an OSA sends a generic alert to the Network Problem Determination Application (NPDA) hardware monitor at the NetView operator console. Each alert provides notification of the pending or actual loss of service and relevant data.

##### Category 1

is sent when a permanent software error occurred on the OSA that requires manual intervention. All internal recovery procedures have already failed.

##### Category 2

is sent when a temporary software error occurred on the OSA that does not require external intervention. Internal recovery has been successful.

##### Category 3

is sent when a hardware error occurred on the OSA that requires manual intervention. All internal recovery procedures have failed.

##### Category 7

is sent when an error occurred that was caused by the hardware or software configuration.

##### Category 8

is sent when an SNA protocol error was detected that requires no external intervention. The OSA mode remains active.

### Category 9

indicates that a communications equipment error was detected that caused a threshold to be exceeded.

### Category 10

is sent when a permanent error condition exists that is outside the span of the OSA's control.

## Solicited Adapter Statistics

An OSA can also be solicited, or queried, to provide data to the NetView operator console when it receives a Central Site Control Facility (CSCF) command. The OSA provides a list, or profile, of all the components that can be queried. From the profile, the NetView operator can select a hardware (HW) component, software (SW) component, and adapter name.

## Guidelines on Querying an OSA for NetView Data

Here is a checklist to assist the NetView operations personnel. For more information, refer to the NetView books, some of which are listed in the bibliography (page ix).

1. Make sure an SSCP-PU session has been established to access the CSCF session. OSA SNA management services use the following SNA request units (RUs): Network Management Vector Transport (NMVT), Activate Physical Unit (ACTPU), and Deactivate Physical Unit (DACTPU).
2. Establish a NetView CSCF session by issuing the CSCF command from the Network Communications Control Facility (NCCF) or another NetView component. DISKREM is the task name.

 CSCF    PU= *puname*  
          PURGE ALL | BEFORE *mm/dd/yy hh:mm*  
          COPY

Where:

**PU=** is a required parameter. Specify the 8-character physical unit name by which you defined the OSA to VTAM in SWNET PU Definition statement.

**PURGE** is an optional parameter to clear the CSCF VSAM data base of either all panel templates or those that have not been used since the specified date or since the specified date and time.

**COPY** is an optional parameter that sends the current display to the network log and to the hardcopy terminal if one is connected. CSCF must be active and a CSCF panel must be displayed.

3. Issue one of the Query commands that are displayed on the **OSA Commands** panel.
  - On the top title line, of the **OSA Commands** panel, the panel ID, panel tile, and PU name are displayed.
  - On the message line, the messages are displayed to notify the user ID whether the command was successful or failed, whether a time-out limit was reached, and any syntax errors that were made.
  - Enter one of the following OSA Query commands on the CMD line. Begin an OSA command with a slash '/' to distinguish it from a NetView command. Note that time on the output of a Query command indicates the lapsed time since the last IPL.

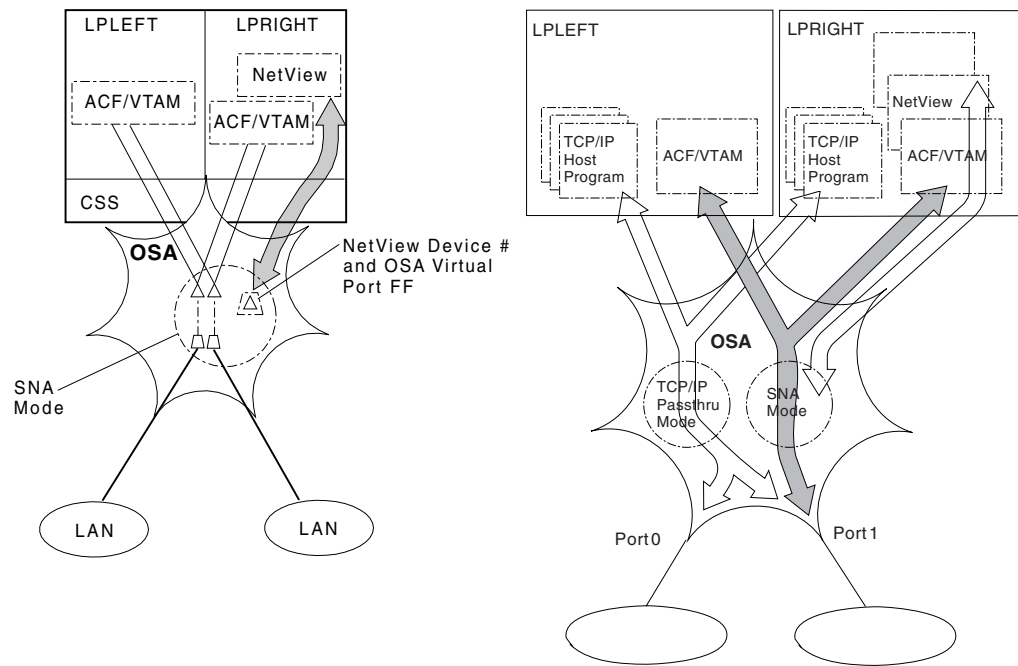
**/QUERY** to obtain a list of the OSA components that can be queried

**/QUERY***component*, replacing the component variable with one of the following options: **HW**, **SW**, adapter name, or task name.

- The PF keys have conventional meanings. Press:  
**PF2** to return to the preceding NetView component or return to NCCF.  
**PF3** to return to the previous panel  
**PF6** to roll  
**PF7** to scroll backward one panel  
**PF8** to scroll forward one panel  
**PF11** to display the current statistical counter values  
**PF12** to retrieve the immediately preceding command

## NetView Support via Box Manager Node

For a TR and a FDDI OSA-2, NetView communications require a Box Manager node and CSCF interface for viewing solicited information. In the following figures, the additional definitions are shown that you need to specify a Box Manager node for these OSAs.



## Tasks

- System hardware I/O configuration definitions are provided on page 103.
- OSA definitions are described on page 104.
- VTAM definitions are listed in the next section.

## VTAM Definitions

Establish an SSCP-PU session for communications between an OSA and an SNA network management service, such as NetView.

**Associate one XCA major node as the box manager XCA major node.** This allows an OSA to have minimal network management and to send generic alerts to the NetView program when the OSA is being run in the SNA mode.

- Specify MEDIUM=BOXMGR on the PORT definition statement.
- Do not specify a DIAL parameter in the Group Definition statement.
- Only one GROUP, LINE, and PU definition statement is allowed.
- Otherwise, follow the guidelines presented on page 115 .

**Define one Switched Network (SWNET)major node.** Specify an IDBLK value of 074 and a PUTYPE of 2 on the PU definition statement. The switched major node for the PU of the OSA does not need a PATH statement, and there should be no LU definitions. The PU Definition statement is shown here.

```
name PU ADDR=link_station_address, PUTYPE=pu_type,  
      IDBLK=id_block_value, IDNUM=id_num_value
```

**name**

Specifies the minor node name of the physical unit represented by this definition statement.

**link\_station\_address**

Specifies the hexadecimal station address for the physical unit.

**pu\_type**

Specifies the PU type for this peripheral, which must be a 2.

**id\_block\_value**

Specifies the block value, which must be 074 for OSA.

**id\_num\_value**

Specifies a 5-digit hexadecimal number that identifies the specific device. For OSA this must match the value specified in OSA/SF when you set up a SNA OAT entry for SNA network management.

**Note:** Activate the SWNET major node before activating the XCA major node. Otherwise, the Boxmanager PU will stay in the connectable (CONCT) state. The line will not become active; you will get the VTAM IST690I message instead.

## An Example of a FDDI OSA-2's Box Manager Node

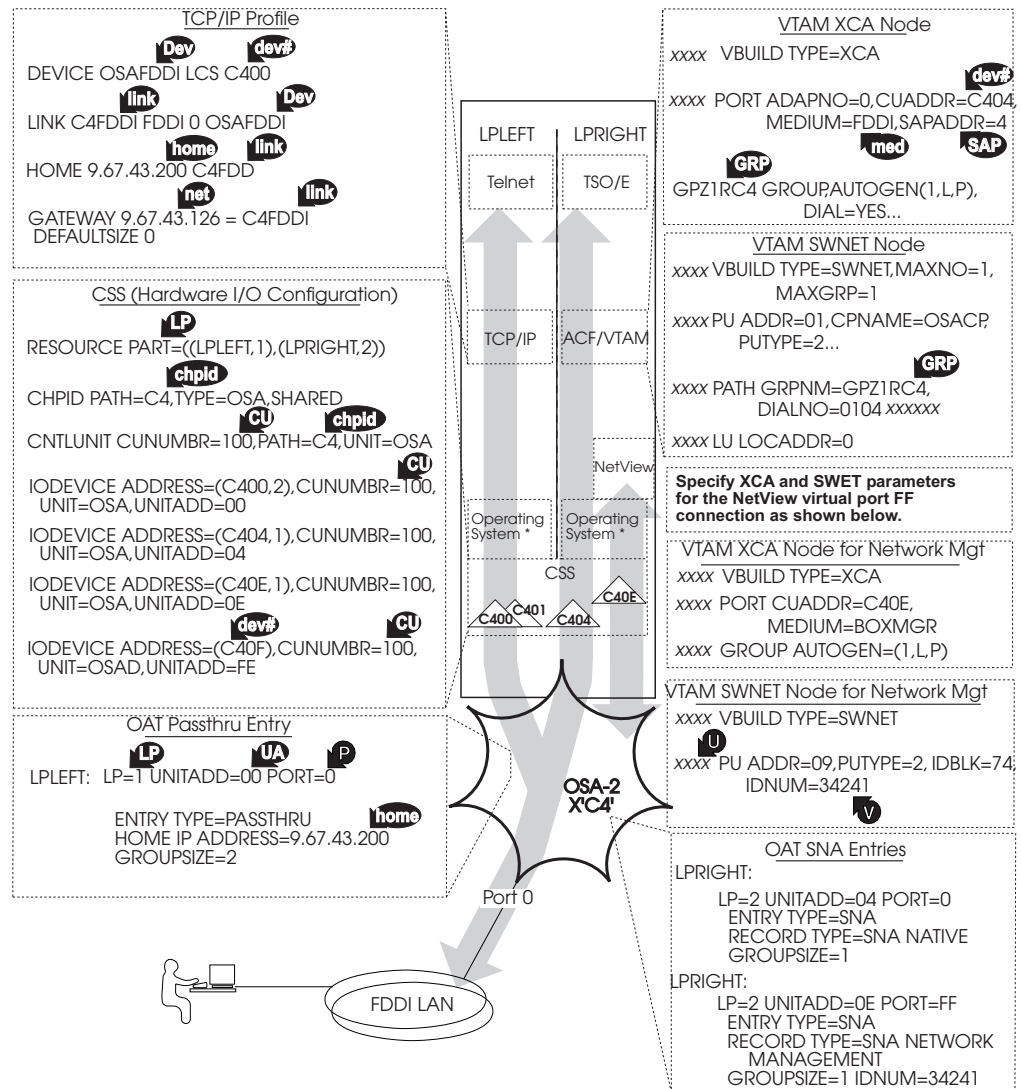


Figure 41. Example of Box Manager Node Configuration





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## Chapter 9. OSA Port Management

An OSA port is used to transfer data between the host platform and the network attached to the port. The physical characteristics of the OSA ports are discussed in Chapter 2. In this chapter, their traffic parameters and statistics are described using the format that is displayed by the OSA/SF OS/2 interface (GUI).

| For planning information on the following topics,         | See:     |
|-----------------------------------------------------------|----------|
| Notes on port management                                  | Page 127 |
| MAC address or End System Identifier (ESI)                | Page 128 |
| Port notebook for the SNA mode port parameters            | Page 106 |
| Port notebook for a FDDI port                             | Page 129 |
| Port notebook for an OSA-2 port token-ring LAN connection | Page 142 |

---

### General Notes

- To view the current settings of port parameters, which you would do, for example, to gather statistical data about port traffic or to investigate the cause of a port problem, the following services and programs are available.
  1. If you are using an OSA/SF GUI, you can view and refresh the appropriate panel that GUI displays. For the other OSA/SF interfaces, you can issue the OSA/SF commands, such as the Query command and Set Parameter command.
  2. You can also view OSA port parameters at the standalone support element or single object operations via the hardware management console. For more information, refer to the operator's guide of the hardware platform that is being used.
- To set a port's hardware state, consider the following.
  - Enabling and disabling a physical OSA port is controlled at the hardware management console of a z900. However, the Control mode in the appropriate panels, or frames, of these consoles can be set to Yes or No.
    - Yes = only users of the hardware console can change the state of the physical OSA port.
    - No = applications such as OSA/SF can change the state of the physical OSA port.
- To stop port traffic, take the following steps.
  1. Identify all the OSA devices that are associated with the LAN port number in the active OSA mode or modes. Check the OSA's OAT entries for a list of the devices.
  2. Stop the host programs from using these devices.
  3. **Vary all the devices off from all the LPs before you disable the port.** For example, in an OS/390 environment, you can use the host operating system commands or ESCON Manager.
  4. Disable the port.
- To start port traffic, take the same steps that you took to stop port traffic, but in reverse order.

---

## MAC Address

### General Notes

1. **A media access control (MAC) address** uniquely identifies a port that is physically attached to a LAN. Therefore, each port on an token ring or FDDI OSA-2 is shipped with its unique, or universal, MAC address.  
You can set a local MAC address and specify that a port receives frames for a group destination MAC address as discussed in the following sections. Use OSA/SF, the support element (SE), or single object operations via the hardware management console.
2. **To summarize:**
  - A token ring OSA-2 is shipped with 2 universal MAC addresses, one for each port.
  - A FDDI OSA is shipped with 1 universal MAC address.

### Notes on a Local MAC Address

Under the following conditions, you can or must set a locally-administered MAC address for an OSA LAN port and should consider doing so for the following reasons:

- A local MAC address can be easier to identify by network personnel because it conforms to the network's or site's naming convention.
- A local MAC address would not need to be changed if the OSA is physically replaced. A replaced OSA, of course, brings its own universal MAC addresses with it.

#### Notes:

1. You must specify the same local MAC address for each port that will be specified as a member of a group of ports that collectively enhance session availability in the SNA mode (page 109).
2. A local MAC address must be unique within the network in which it is used and administered by a local authority. It is therefore a unicast MAC address.
3. For a local MAC address to take effect, the OSA channel must be configured offline from, and then back online to, all the partitions to which the OSA feature is defined.
4. Set a MAC address for a FDDI or token-ring connection in the *noncanonical* format as shown below.

The bits within the same byte are transposed (swapped) between a canonical and noncanonical address. In the noncanonical format of a FDDI or token-ring MAC address, bit 0 indicates whether the MAC address is an individual (0) or group (1) address; bit 1 indicates whether the MAC address is universal (0) or local (1).

5. You can set a local MAC address for any port using OSA/SF if the PTF resolution to the appropriate OSA/SF APAR has been applied.
6. You can set a local MAC address for a port on a token ring or FDDI OSA-2 using the support element (SE) or single object operations via the hardware management console.

For procedural information, refer to the operator's guide for the hardware platform (page ix).

| For these types of LANs and ports                                                                                                                          | Specify as shown                                                                                                                         |
|------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>For a FDDI port attached to a FDDI LAN:</li> </ul>                                                                  | <ul style="list-style-type: none"> <li>Set bit 0=0 and bit 1=1</li> <li>Set bits 2–47 to the 46-bit local MAC address</li> </ul>         |
| For a token-ring connection as follows: <ul style="list-style-type: none"> <li>A token ring OSA-2 port when it is attached to a token-ring LAN:</li> </ul> | <ul style="list-style-type: none"> <li>Set bit 0=0 and bit 1=1</li> <li>Set bits 2 through 47 to the 46-bit local MAC address</li> </ul> |

## Notes on a Group MAC Address

- Here is an example of a Group MAC address pulldown menu.

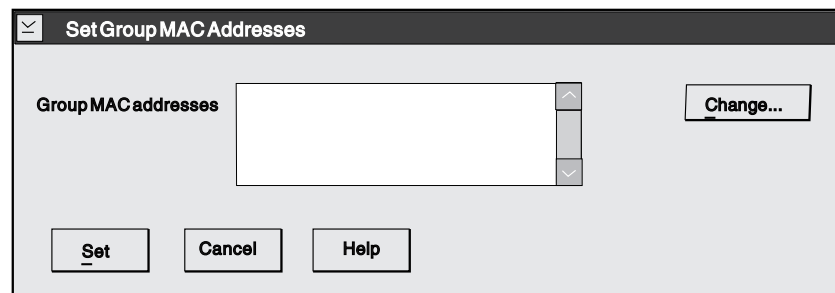


Figure 42. Group MAC Address Dialog

- A group MAC address allows the port to receive frames with that group's destination MAC address.
  - Assign a group MAC address as a 48-bit unsigned integer using OSA/SF.
  - If the PTF resolution to OSA/SF APAR OW33393 (OS/390 and MVS/ESA), OW33394 (VM/ESA) or PQ16071 (VSE/ESA) is applied, you can assign a group MAC address of all zeros, but not an address of all X'FF'.
- For a nonzero group MAC address:
- Set bit 0 to 1 for a FDDI LAN or token-ring LAN connection.
- If the PTF resolution to OSA/SF APAR OW33393 (OS/390 and MVS/ESA), OW33394 (VM/ESA) or PQ16071 (VSE/ESA) is *not* applied, the following rules apply:
    - Set bits 0 and 1 to 1 for a FDDI LAN connection.
    - Set bits 0,1, and 16 to 1 and set bits 2 through 15 to 0 for a token-ring LAN connection.

---

## FDDI Port

### General Notes

- A FDDI OSA-2 has only one port. This port can be connected to either one single- or dual-ring FDDI LAN. The term connection unfortunately has a second connotation because each fiber connection to a FDDI port is also called a port. These are port *a* and port *b*, one of which is designated as the primary path and one as the secondary path.
- For explanations of the FDDI port parameters, refer to *X3T9.5 ANSI FDDI Statement Management, Revision 7.2*.

- To reset the port parameters listed in this section, use either the appropriate port notebook panels displayed by the OSA/SF OS/2 interface (GUI) or the OSA/SF Set Parameters command. For more information, refer to the appropriate OSA/SF user's guide listed in the bibliography.
- In addition to displaying the settable FDDI port parameters, OSA/SF and the hardware management console display a large number of non-settable parameter values for a FDDI port. For information on displaying those parameters, also see the OSA/SF user's guide or operator's guide of the hardware management console of the appropriate hardware platform.

## Two Pages of FDDI Station Management (SMT) Group

### FDDI SMT Group (Page 1 of 2)

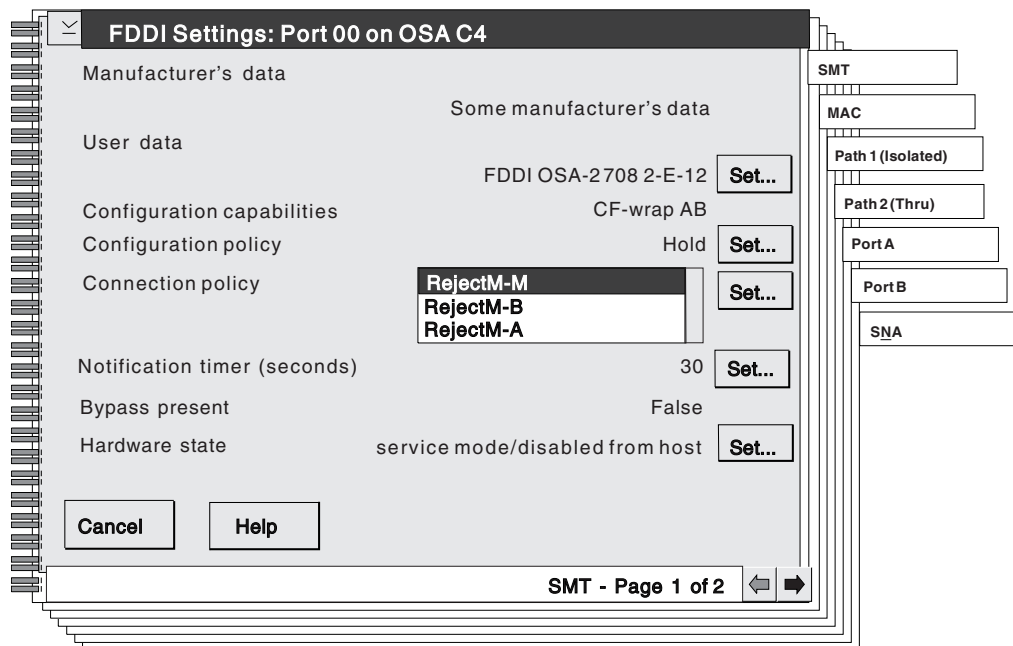


Figure 43. SMT Notebook Page 1

OSA/SF displays a user data field for each port. You can click **Set** to enter any 32-character string using OSA/SF.

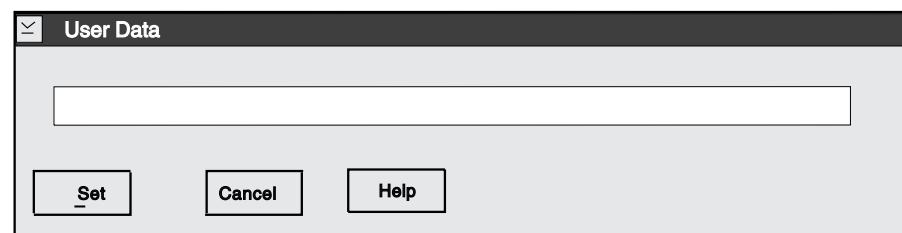
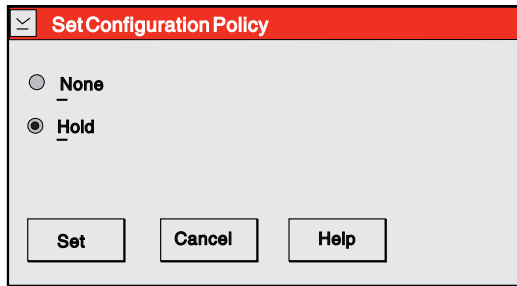


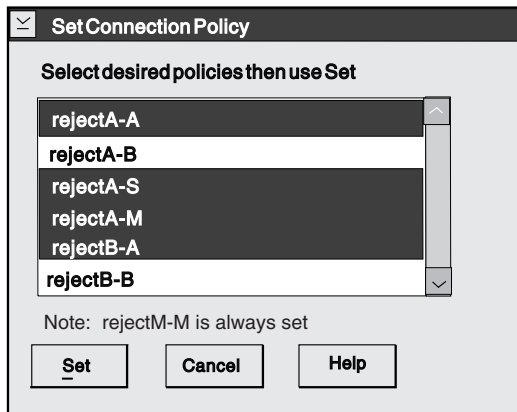
Figure 44. User Data Dialog

Click **Set** next to Configuration policy to change the setting.



Accept or override the Hold default station configuration policy. Hold means that a connection will be held in abeyance, or delayed, until it is needed.

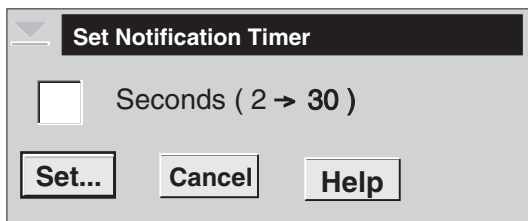
Click **Set** next to Connection policy to change these settings.



A = the primary connector (page 24).  
 B = the secondary connector.  
 M = master, which OSA does not support.  
 S = slave.

The connections that are rejected are displayed for selection. For example, **reject A–B** means the primary connector (A) of this station rejects a connection to the secondary connector (B) of the adjacent, or PC neighbor, station. M-M is always rejected. (See ANSI 9.6.3.)

The Notification timer setting can be changed as follows.



Accept the 30-second default to be used in neighbor notification protocol or override with the values shown on the panel. (See ANSI SMT 8.2.)

Click Set next to hardware state to change that setting.

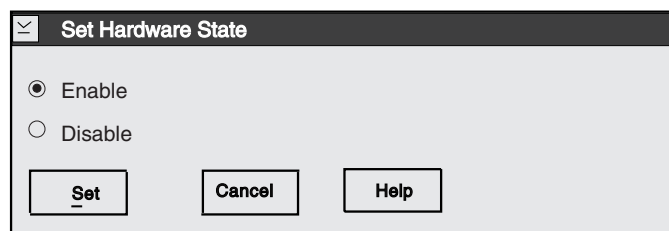


Figure 45. Hardware State Dialog

## FDDI SMT Group (Page 2 of 2)

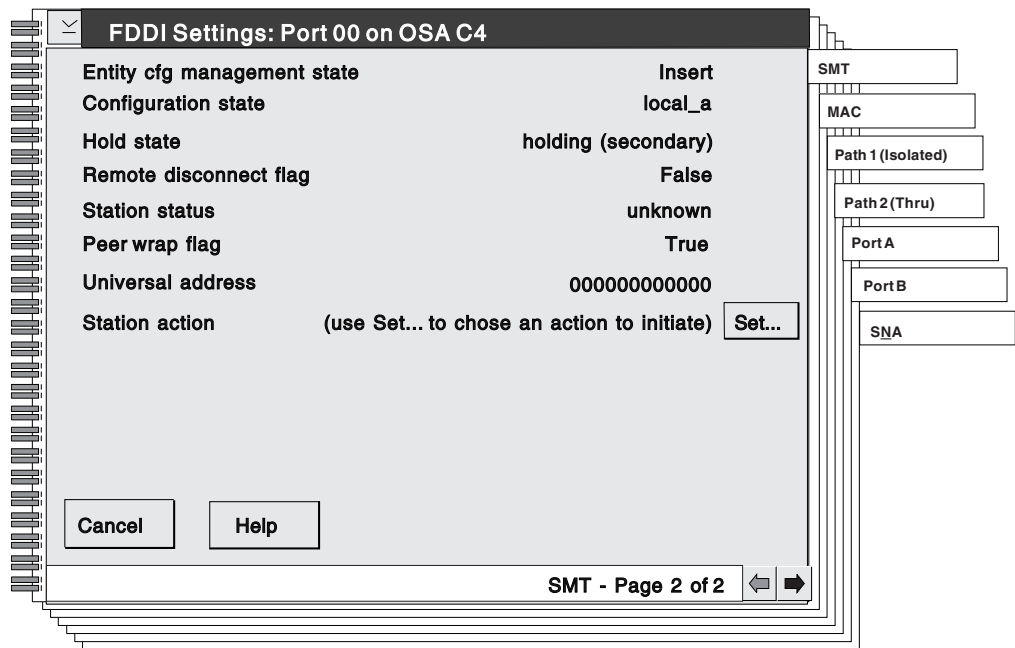
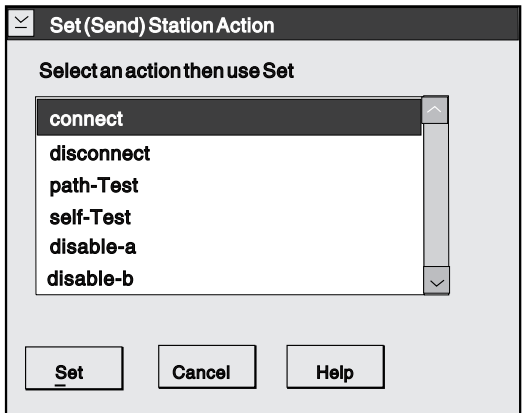


Figure 46. SMT Notebook Page 2

Click **Set**next to Station action to change these setting.



**connect** starts a connect sequence, and **disconnect** stops it. (ANSI Ref 9.4.2.) **path-Test** sets testing of the path, and **self-Test** initiates a station self-test. (ANSI Ref 9.4.1, but the results of this action are not specified in this standard.) **disable-a** causes a PC-disable on the primary connector if port a is peer. **disable-b** causes a PC-disable on the secondary connector if port b is peer.

## Five Pages of FDDI MAC Group

### FDDI MAC Group (Page 1 of 5)

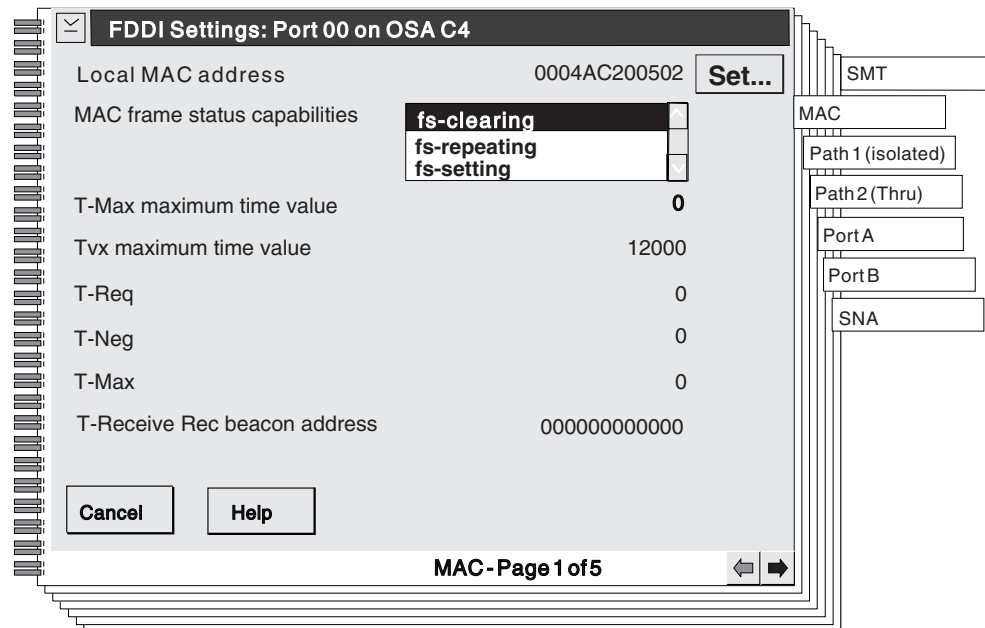
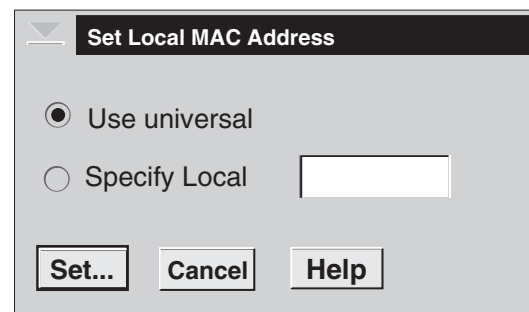


Figure 47. FDDI MAC Notebook Page 1

Here is an example of the local MAC address dialog. For information on a local MAC address, see page 128.



### FDDI MAC Group (Page 2 of 5)

**FDDI Settings: Port 00 on OSA C4**

Group MAC addresses: 000000000000 **Set...**

**Multicast information**

| LP number<br>(LP name) | Unit address<br>(device name) | Multicast<br>IP address | Group<br>MAC address |
|------------------------|-------------------------------|-------------------------|----------------------|
| 01(LPLEFT)             | 00(C400),01(C401)             | 234.5.6.7               | 80007AA060E0         |
| 02(LPRIGHT)            | 02(C402),03(C403)             | 234.5.6.7               | 80007AA060E0         |

**Cancel** **Help**

MAC - Page 2 of 5

Navigation buttons: SMT, MAC, Path 1 (isolated), Path 2 (Thru), Port A, Port B, SNA

Figure 48. FDDI MAC Notebook Page 2

#### Notes:

1. For information on a group MAC address, see page 129.
2. In a CS for OS/390 environment, OSA-2 supports IP multicast addresses in the TCP/IP Passthru mode. If the PTF resolution to OSA/SF APAR OW33393 is applied, OSA/SF displays the IP multicast addresses of the registered members of the multicast group for this OSA.

#### FDDI MAC Group (Page 3 of 5)

**FDDI Settings: Port 00 on OSA C4**

Paths available: none **Set...**

Current path: isolated

Requested paths: concatenated-alternate, local, secondary-preferred **Set...**

Upstream neighbor: 000000000101

Downstream neighbor: 000000000202

Downstream port type: a

Duplicate address test flag: none

**Cancel** **Help**

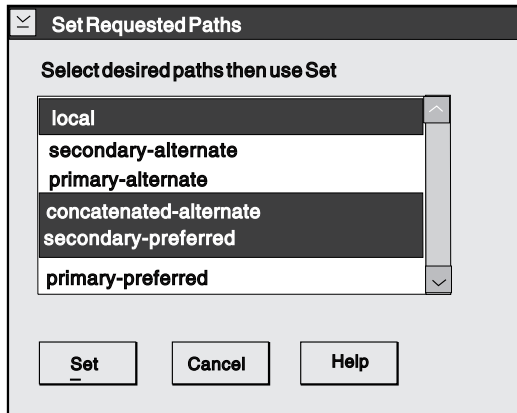
MAC - Page 3 of 5

Navigation buttons: SMT, MAC, Path 1 (isolated), Path 2 (Thru), Port A, Port B, SNA

Figure 49. FDDI MAC Notebook Page 3

Use the Set Requested Paths dialog to make different selections.





Select the paths into which the MAC may be inserted (ANSI SMT 9.7.)

## FDDI MAC Group (Page 4 of 5)

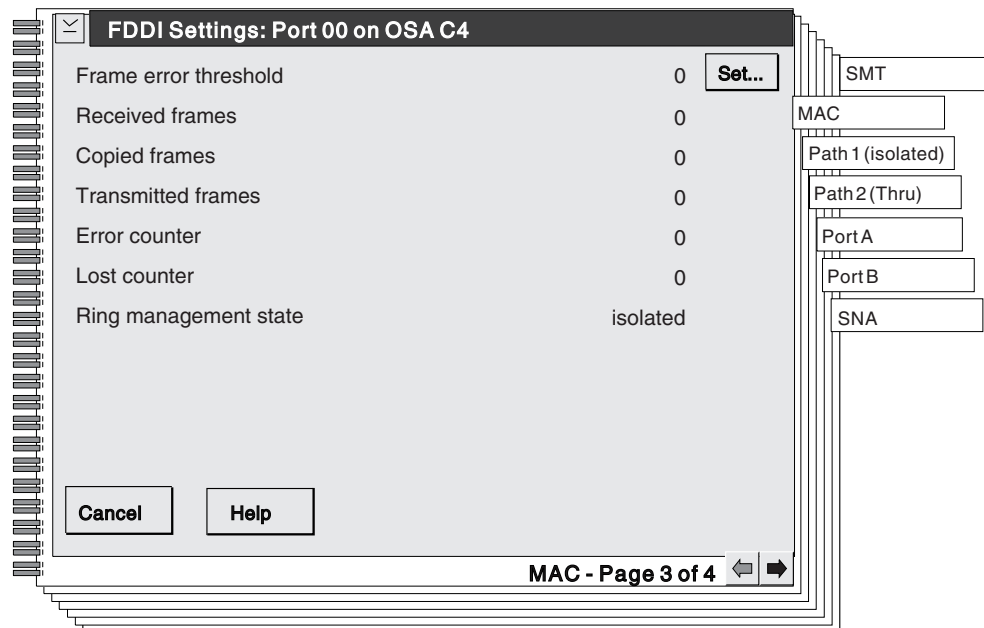
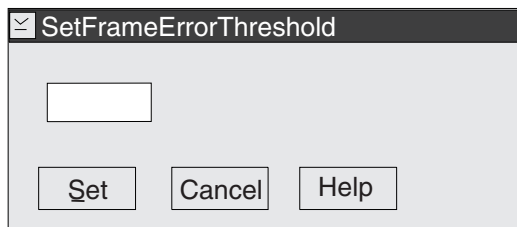


Figure 50. FDDI MAC Notebook Page 4

Click **Set** to change error threshold value.



Set the threshold for determining when a MAC condition report will be generated (ANSI 8.3.1.1). The default is 0 (zero).

# FDDI MAC Group (Page 5 of 5)

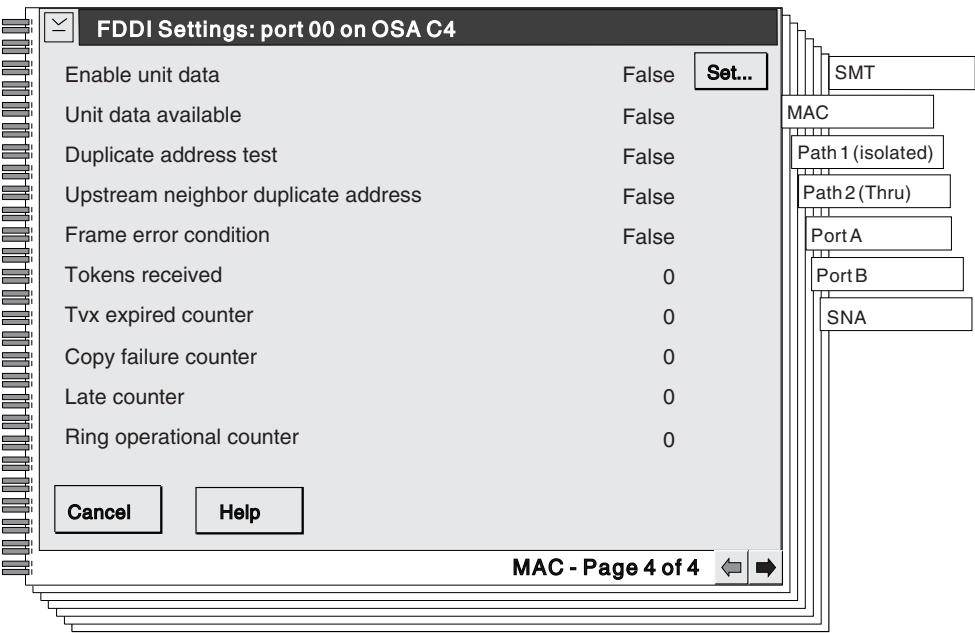
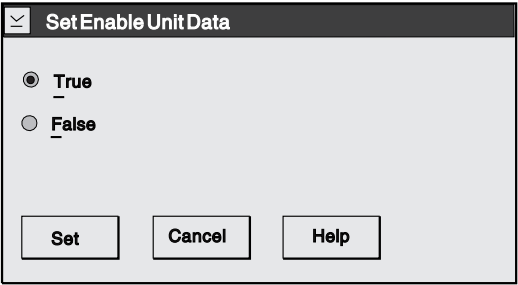


Figure 51. FDDI MAC Notebook Page 5

Click **Set** to change Enable unit data setting.



Determine the value of the MA\_UNITDATA\_Enable flag in RMT.

- True (1) is the default and initial value.
- False (0) overrides the default.

# One Page of FDDI Path Group

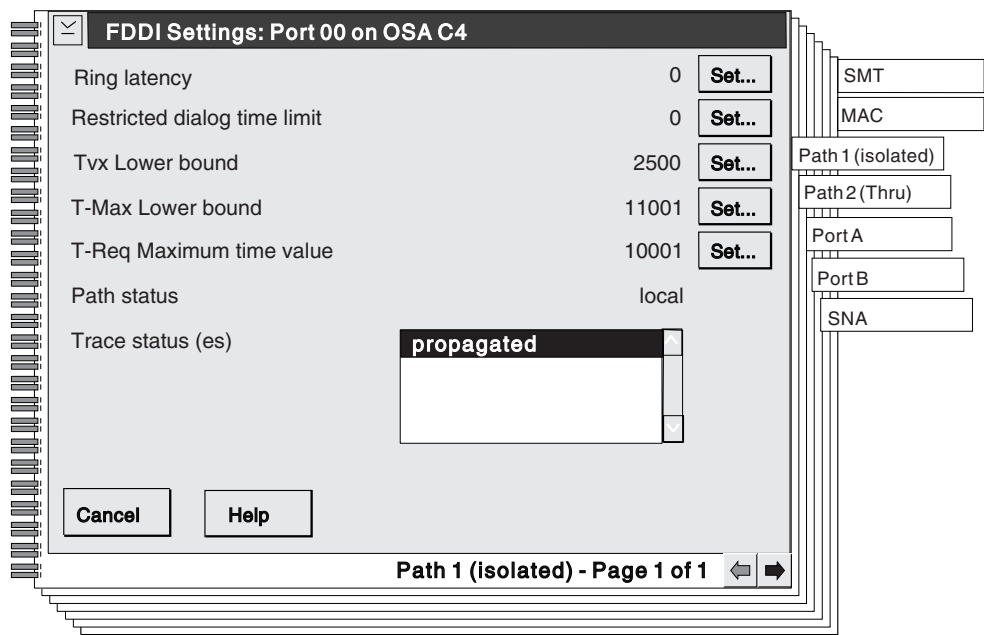
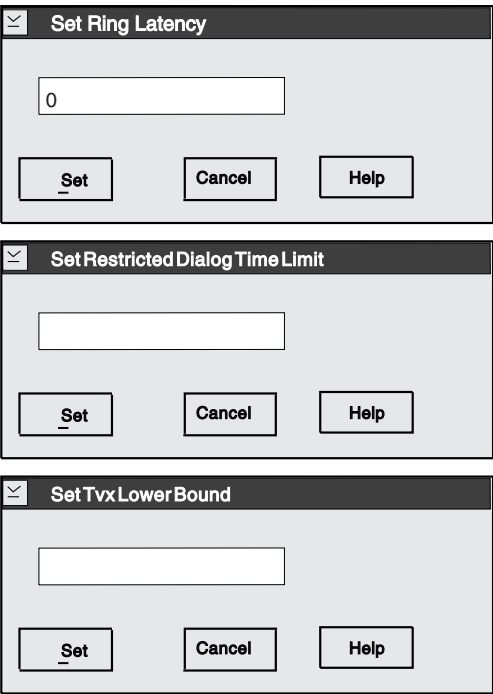


Figure 52. FDDI Path Group Notebook Page

The FDDI Path Group notebook page provides the means to change settings for the following:



Latency is the delay in the ring. Set a value  $1 \leq x \leq 2147483647$ .

Set a value in the range from 0 through 343,597 seconds (ANSI X3T9).

Specifies the minimum time value of Txv used by any MAC that is configured in this path. The default and initial value is 2500 nanosec (2.5msec). Specify a value of 0 or greater, but less than the TReq Maximum time shown in that panel.

Set T-Max Lower Bound

[Text Field]

[Set] [Cancel] [Help]

Specifies the minimum time value of Tmax that shall be used by any MAC that is configured in this path.

Set T-Req Maximum Time

[Text Field]

[Set] [Cancel] [Help]

Specifies the maximum time value of Treq that shall be used by any MAC that is configured in this path.

## Four Pages of FDDI Port AIB Group

### Notice!

In this book, a *station* is generally equated with a *port*. A FDDI station is a FDDI port, or vice versa. As described on page 24, however, a FDDI station has two port connectors, which are rather confusingly called *port a* and *port b*.

The port pages for port a and port b are identical, so only one set is listed in the following sections.

## One Port (Port a) Group (Page 1 of 4)

FDDI Settings: Port 00 on OSA 7C

Port type: a

Connection policy: pc-mac-lct, pc-mac-loop [Set...]

Paths available: local, primary, secondary

Current path: secondary

MAC placement: 0

Requested paths: None, secondary-alternate, concatenated-alternate [Set...]

Tree: local, primary-alternate

Peer: concatenated-alternate

[Cancel] [Help]

Port A - Page 1 of 4

Port A: SMT, MAC, Path 1 (Isolated), Path 2 (Thru)

Port B: SNA

Figure 53. FDDI Port Notebook Page 1

Two parameters can be set from the Port Notebook page 1:

**Set Connection Policy**

Select desired policies then use Set

|           |
|-----------|
| rejectA-A |
| rejectA-B |
| rejectA-S |
| rejectA-M |
| rejectB-A |
| rejectB-B |

Note: rejectM-M is always set

A = the primary connector (page 24). B = the secondary connector. M = master, which OSA does not support. S = slave.

The connections that are rejected are displayed for selection. For example, **reject A-B** means the primary connector (A) of this station rejects a connection to the secondary connector (B) of the adjacent, or PC neighbor, station. M-M is always rejected. (See ANSI 9.6.3.)

**Set Requested Paths**

Select desired paths then use Set

|                        |
|------------------------|
| local                  |
| secondary-alternate    |
| primary-alternate      |
| concatenated-alternate |
| secondary-preferred    |
| primary-preferred      |

Select the paths into which the MAC may be inserted (ANSI SMT 9.7.)

## FDDI Port a Group (Page 2 of 4)

**FDDI Settings: Port 00 on OSA C4**

|                             |                                                                                                   |                                                                       |
|-----------------------------|---------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|
| MAC loop time (nanoseconds) | 200                                                                                               | <input data-bbox="1153 1218 1218 1249" type="button" value="Set..."/> |
| PMD class                   | twisted-pair                                                                                      |                                                                       |
| Connection capabilities     | <input checked="" type="checkbox"/> pc-mac-lct<br><input checked="" type="checkbox"/> pc-mac-loop |                                                                       |
| Transmitted line state      | hts-halt                                                                                          | <input data-bbox="1153 1365 1218 1396" type="button" value="Set..."/> |
| Line state received         | pdr-active                                                                                        |                                                                       |

Port A - Page 2 of 4

Figure 54. FDDI Port Notebook Page 2

The following parameters can be set from port page 2:

**Set MAC Loop Time**

The default is 200 milliseconds (200 msec), which can be overridden. This object controls the value used by the FDDI attribute Tnext to prevent deadlock. This allows sufficient time for the MAC recovery process to complete and the exchange of neighbor information frames.

**Set Transmitted Line State**

Select desired state then use Set

qls-quiet  
ils-idle  
mls-master  
**hls-halt**  
pdr-active  
lsu-unknown

Refer to *X3T9.5 ANSI FDDI Statement Management, Revision 7.2*.

## FDDI Port a Group (Page 3 of 4)

**FDDI Settings: Port 00 on OSA C4**

|                          |   |                                       |
|--------------------------|---|---------------------------------------|
| Elasticity buffer errors | 0 |                                       |
| Confidence test errors   | 0 |                                       |
| Link error rate          | 0 |                                       |
| LEM reject count         | 0 |                                       |
| LEM error count          | 0 |                                       |
| Link error rate cutoff   | 0 | <input type="button" value="Set..."/> |
| Link error rate alarm    | 0 | <input type="button" value="Set..."/> |

Port A - Page 3 of 4

SMT  
MAC  
Path 1 (Isolated)  
Path 2 (Thru)  
Port A  
Port B  
SNA

Figure 55. FDDI Port Notebook Page 3

Two link error parameters can be set from port page 3:

**SetLinkErrorRateCutoff**

Accept the default of 7 or specify a value in the range from 0–15. This determines the link error rate estimate at which a link connection will be broken.

**SetLinkErrorRateAlarm**

Accept the default of 8 or specify a value in the range from 0–15. This determines the link error estimate at which a link connection will generate an alarm.

## FDDI Port a Group (Page 4 of 4)

**FDDI Settings: Port 00 on OSA C4**

|                      |                                             |                                       |
|----------------------|---------------------------------------------|---------------------------------------|
| Connect state        | disabled                                    | <input type="button" value="Set..."/> |
| PCM state            | off                                         |                                       |
| PC withhold          | move                                        |                                       |
| Link error condition | False                                       |                                       |
| Port action          | (use Set... to chose an action to initiate) |                                       |

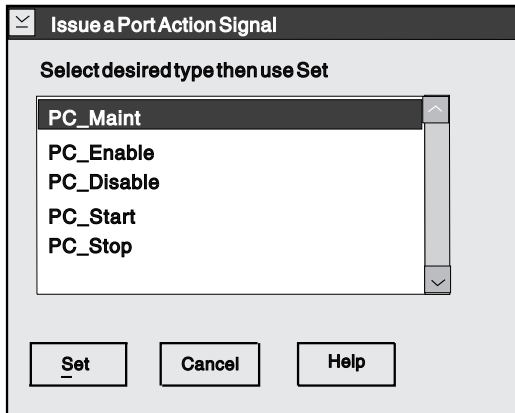
Port A  
Port B  
SNA

SMT  
MAC  
Path 1 (Isolated)  
Path 2 (Thru)

Port A - Page 4 of 4

Figure 56. FDDI Port Notebook Page 4

The following parameter can be set from port page 4:



Causes a control signal to be generated with a control action of 'Signal' and the 'variable' parameter set with the appropriate value, such as PC\_Maint, PC\_Enable, PC\_Disable, PC\_Start, or PC\_Stop. (ANSI 9.4.2).

## One SNA Page

See page 106 for the panel with the SNA mode port parameters.

---

## Port Notebook for a Token-Ring LAN Connection

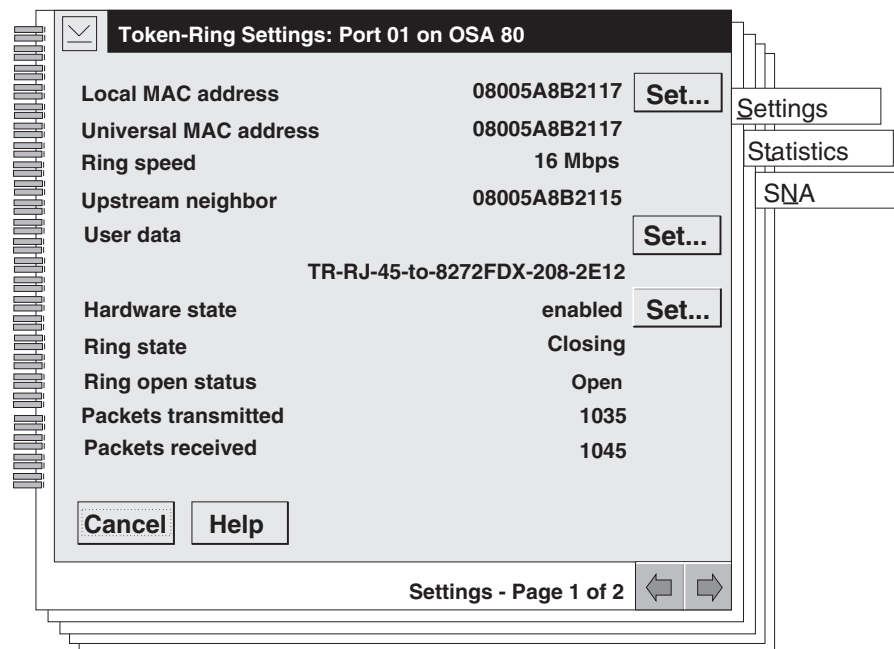
OSA/SF GUI displays a multi-page port notebook for a token-ring LAN connection: 2 pages of token-ring settings; 2 pages of statistics; and 1 page of SNA port parameters if the port is being used in the SNA mode.

- For more information on the token-ring port values, refer to RFC 1231, which is the TCP/IP protocol standard for the IEEE 802.5 token-ring MIB.
- OSA/SF GUI can display all the token-ring port parameters. Refer to the appropriate OSA/SF user's guide.
- Depending on the processor, the standalone support element or single object operations via the hardware management console can also be used to display a large number of these port parameters. Refer to the books on the hardware management console of the appropriate hardware platform.



## Two Pages of Token-Ring Settings

### Token-Ring Settings (Page 1 of 2)



The dialog box is titled "Token-Ring Settings: Port 01 on OSA 80". It contains the following settings:

|                              |              |        |
|------------------------------|--------------|--------|
| Local MAC address            | 08005A8B2117 | Set... |
| Universal MAC address        | 08005A8B2117 |        |
| Ring speed                   | 16 Mbps      |        |
| Upstream neighbor            | 08005A8B2115 |        |
| User data                    |              | Set... |
| TR-RJ-45-to-8272FDX-208-2E12 |              |        |
| Hardware state               | enabled      | Set... |
| Ring state                   | Closing      |        |
| Ring open status             | Open         |        |
| Packets transmitted          | 1035         |        |
| Packets received             | 1045         |        |

Buttons: Cancel, Help

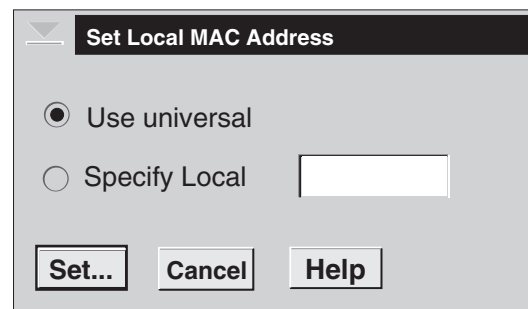
Page indicator: Settings - Page 1 of 2

Navigation: Left arrow, Right arrow

Background tabs: Settings, Statistics, SNA

Figure 57. Token Ring Settings Notebook Page 1

Click Set to specify a local MAC address. For information on how to define a locally-administered MAC address, see page 128.



The dialog box is titled "Set Local MAC Address". It contains the following options:

☒ Use universal

☐ Specify Local

Buttons: Set..., Cancel, Help

Figure 58. Local MAC Address Dialog

OSA/SF displays a user data field for each port. You can enter any 32-character string using OSA/SF.

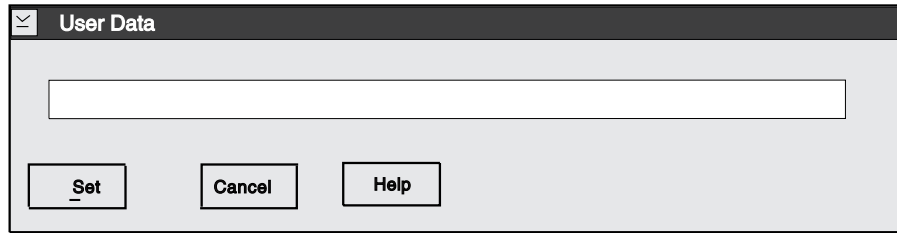


Figure 59. User Data Dialog

Click Set next to hardware state to change that setting.

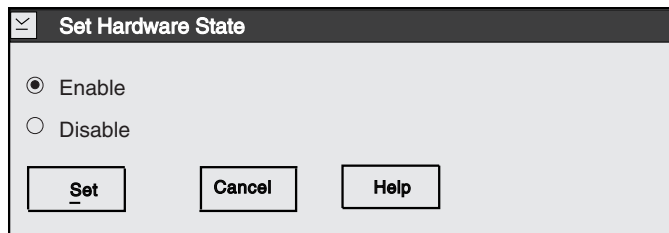


Figure 60. Hardware State Dialog

## Token-Ring Settings (Page 2 of 2)

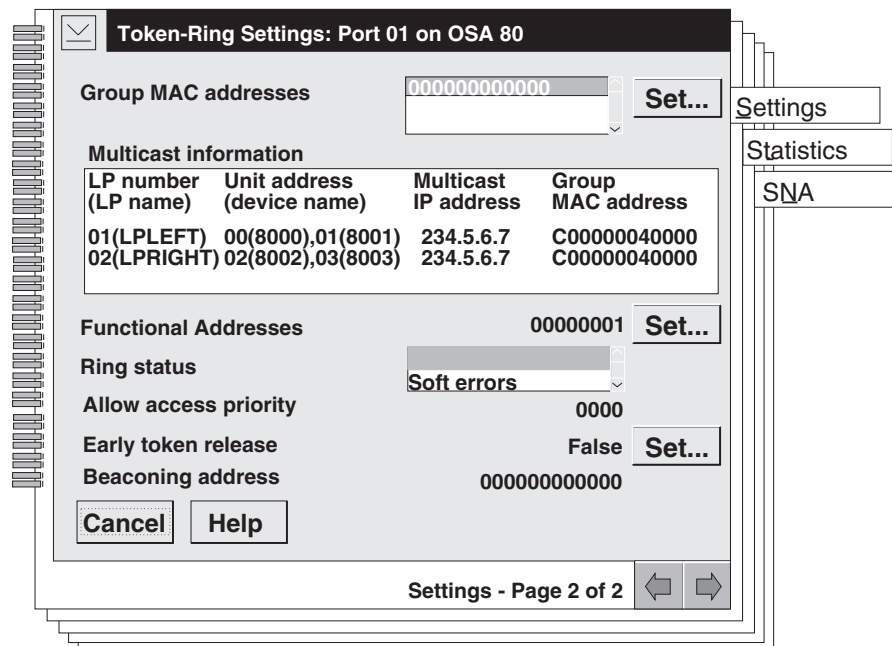


Figure 61. Token Ring Settings Notebook Page 2

For information on a group MAC address, see page 129.

In a Communications Server environment, OSA-2 supports IP multicast addresses in the TCP/IP Passthru mode. If the PTF resolution to OSA/SF APAR OW33393 is applied, OSA/SF displays the IP multicast addresses of the registered members of the multicast group for this OSA.

To set a functional address, click **Set** and enter 8 non-blank hex characters. The port uses bits 1–31 of this address as a bit mask to compare with bits 0–30 of the functional address of an incoming frame. If at least one pair of matched bits is 1, the port receives the frame and performs the corresponding functions. Click **Set** when done.

The Early Token Release dialog allows you to select true or false settings:

- True = On = token is released at the end of the transmit. (This default allows greater use of the ring.)
- False = Off = token is released after the token has been stripped from the ring.

## Two Pages of Statistics

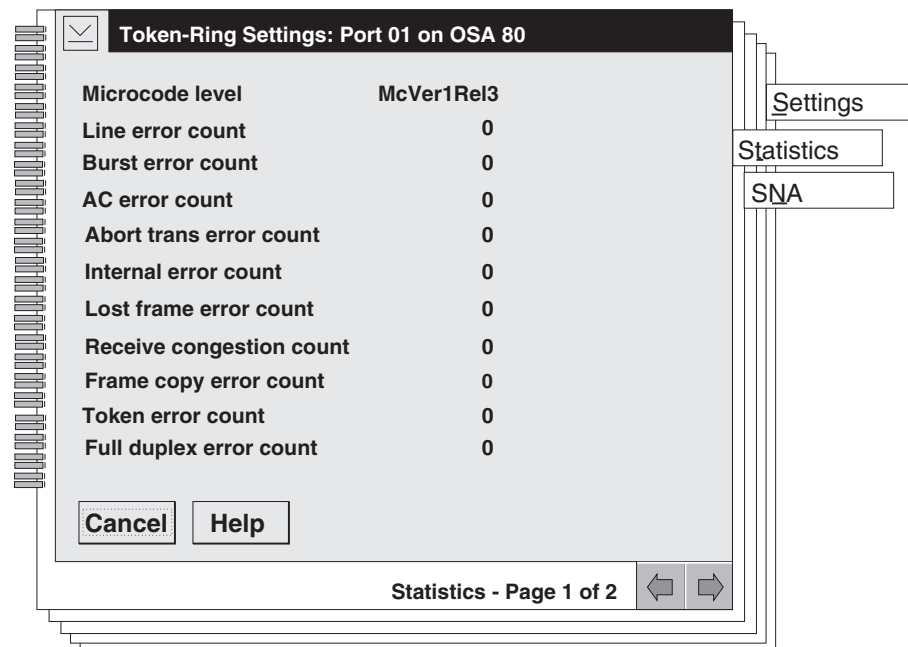


Figure 62. Token Ring Statistics Notebook Page 1

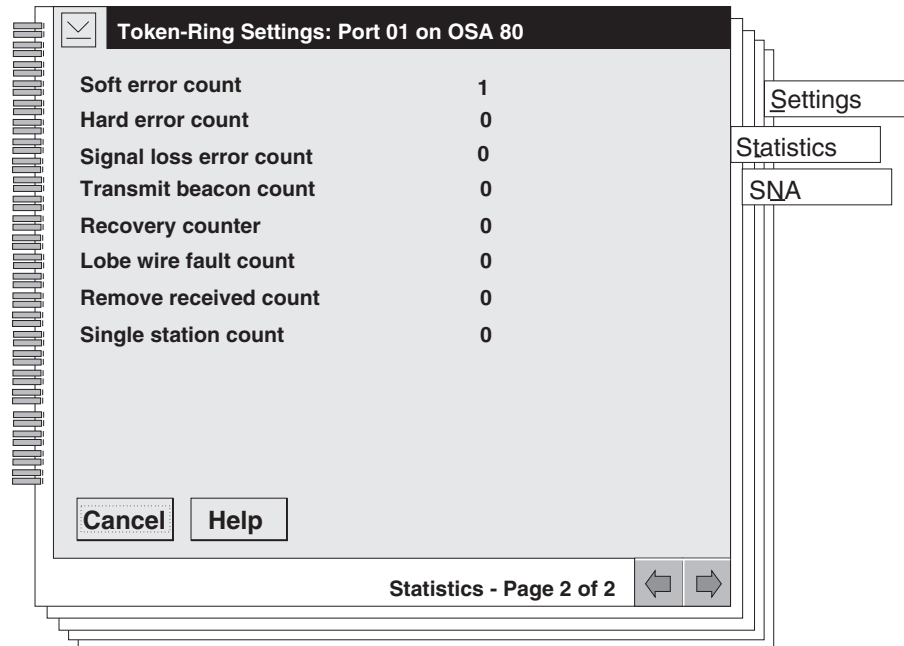


Figure 63. Token Ring Statistics Notebook Page 2

## One SNA Page

See page 106 for the panel with the SNA mode port parameters.

---

## Appendix. Notices

References in this publication to IBM products, programs, or services do not imply that IBM intends to make these available in all countries in which IBM operates. Any reference to an IBM product, program, or service is not intended to state or imply that only IBM's product, program, or service may be used. Any functionally equivalent product, program, or service that does not infringe any of IBM's intellectual property rights may be used instead of the IBM product, program, or service. Evaluation and verification of operation in conjunction with other products, except those expressly designated by IBM, is the user's responsibility.

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